	Type	L #	Hits	Search Text	DBs	Time Stamp	Comments	Error Definitio	Errors
1	BRS	L1	134	(cmp or ("chemical mechanical" adj (polish$3 or planariz$5))) and phosphonic	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/05/12 10:29			0
2	BRS	L8	45	1 and 438/$.ccls.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/05/12 10:30			0
3	BRS	L15	13	@pd<=20001011 and 8	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/05/12 10:31			0
4	BRS	L87	0	phosphonomethyliminodiacetic and 1	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/05/12 11:54			0
5	BRS	L94	142	phosphonomethyliminodiacetic	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/05/12 11:49			0
6	BRS	L101	0	"N-phosphonomethyliminodiacetic acid" and cmp	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/05/12 11:51			0
7	BRS	L108	1	"N-phosphonomethyliminodiacetic acid" and polish$3	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/05/12 11:53			0
8	BRS	L115	0	"N-phosphonomethyliminodiacetic acid" and planariz$5$3	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/05/12 11:53			0

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     FILE 'REGISTRY' ENTERED AT 14:19:13 ON 12 MAY 2003
               E AMINOTRIMETHYLENEPHOSPHONIC/CN

     FILE 'USPATFULL' ENTERED AT 14:21:02 ON 12 MAY 2003
L1             1 S US5783489/PN

     FILE 'CAPLUS' ENTERED AT 14:22:04 ON 12 MAY 2003
L2             0 S US5783489/PN

     FILE 'REGISTRY' ENTERED AT 14:22:53 ON 12 MAY 2003
L3             0 S AMINO/CNS AND TRI/CNS AND METHLENE/CNS AND PHOSPHONIC/CNS ACI
L4             0 S AMINO/CNS AND TRI/CNS AND METHYLENE/CNS AND PHOSPHONIC/CNS AC
L5             3 S AMINO/CNS AND TRI/CNS AND METHYLENE/CNS AND PHOSPHONIC/CNS AN

     FILE 'CAPLUS' ENTERED AT 14:25:10 ON 12 MAY 2003
L6            44 S L5
L7             0 S L1 AND L6

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E2            1     AMINOTRIMETHYLENEPHOSPHINIC ACID/CN
E3            0 --> AMINOTRIMETHYLENEPHOSPHONIC/CN
E4            1     AMINOTRIMETHYLENEPHOSPHONIC ACID AMMONIUM SALT/CN
E5            1     AMINOTRIMETHYLENEPHOSPHONIC ACID DICALCIUM SALT/CN
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E6              1     AMINOTRIMETHYLOLMETHANE/CN
E7              1     AMINOTRIMETHYLSILANE/CN
E8              1     AMINOTRINEOPHYLSTANNANE/CN
E9              1     AMINOTRIPEPTIDASE/CN
E10             1     AMINOTRIPEPTIDASE (CLOSTRIDIUM PERFRINGENS STRAIN 13 GENE PE
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E11             1     AMINOTRIPEPTIDASE (PEPTIDASE T) (OCEANOBACILLUS IHEYENSIS ST
                      RAIN HTE831 GENE OB0531)/CN
E12             1     AMINOTRIPEPTIDASE (PEPTIDASE T) (OCEANOBACILLUS IHEYENSIS ST
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FILE COVERS 1971 TO PATENT PUBLICATION DATE: 8 May 2003 (20030508/PD)
FILE LAST UPDATED: 8 May 2003 (20030508/ED)
HIGHEST GRANTED PATENT NUMBER: US6560778
HIGHEST APPLICATION PUBLICATION NUMBER: US2003088899
CA INDEXING IS CURRENT THROUGH 8 May 2003 (20030508/UPCA)
ISSUE CLASS FIELDS (/INCL) CURRENT THROUGH: 8 May 2003 (20030508/PD)
REVISED CLASS FIELDS (/NCL) LAST RELOADED: Feb 2003
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             IC, ICM, ICS, EXF (STD is the default)
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L1            1 S US5783489/PN

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L1   ANSWER 1 OF 1  USPATFULL
AN     1998:85866  USPATFULL
TI     Multi-oxidizer slurry for chemical mechanical polishing
IN     Kaufman, Vlasta Brusic, Geneva, IL, United States
       Wang, Shumin, Naperville, IL, United States
PA     Cabot Corporation, Boston, MA, United States (U.S. corporation)
PI     US 5783489              19980721                                <--
AI     US 1996-718937          19960924 (8)
DT     Utility
FS     Granted
REP    US 3385682       May 1968              Lowen
       US 3668131       Jun 1972              Banush et al.
       US 4671851       Jun 1987              Beyer et al.
       US 4789648       Dec 1988              Chow et al.
       US 4818333       Apr 1989              Michaud
       US 4910155       Mar 1990              Cote et al.
       US 4944836       Jul 1990              Beyer et al.
       US 4954459       Sep 1990              Avanzino et al.
       US 4956313       Sep 1990              Cote et al.
       US 4992135       Feb 1991              Doan
       US 5137544       Aug 1992              Medellin
       US 5157876       Oct 1992              Medellin
       US 5173438       Dec 1992              Sandhu
       US 5209816       May 1993              Yu et al.
       US 5244534       Sep 1993              Yu et al.
       US 5256402       Oct 1993              Prencipe et al.
       US 5340370       Aug 1994              Cadien et al.
       US 5354490       Oct 1994              Yu et al.
       US 5389194       Feb 1995              Rostoker et al.
       US 5391258       Feb 1995              Brancaleoni et al.
       US 5407526       Apr 1995              Danielson et al.
       US 5476606       Dec 1995              Brancaleoni
       US 5527423       Jun 1996              Neville et al.
       US 5540810       Jul 1996              Sandhu et al.
       US 5575837       Nov 1996              Kodama et al.
EXNAM  Primary Examiner: Jones, Deborah
CLMN   Number of Claims: 38
ECL    Exemplary Claim: 1
DRWN   No Drawings
AB     A chemical mechanical polishing slurry comprising at least two oxidizing
       agents, an organic acid and an abrasive and a method for using the
       chemical mechanical polishing slurry to remove titanium, titanium
       nitride, and an aluminum alloy containing layer from a substrate.

SUMM   BACKGROUND OF THE INVENTION
```

1. Field of the Invention

This invention concerns a chemical mechanical polishing slurry including at least two oxidizers. The chemical mechanical polishing slurry is useful for polishing metal layers and thin-films associated with semiconductor manufacturing. More particularly this invention concerns a chemical mechanical polishing slurry that is especially adapted for polishing multiple metal layers and thin-films where one of the layers or films is comprised of aluminum or an aluminum containing alloy and another layer or thin film is comprised of titanium or a titanium containing alloy such as titanium nitride.

2. Description of the Art

Integrated circuits are made up of millions of active devices formed in or on a silicon substrate. The active devices, which are initially isolated from one another, are interconnected to form functional circuits and components. The devices are interconnected through the use of well-known multilevel interconnections. Interconnection structures normally have a first layer of metallization, an interconnection layer, a second level of metallization, and sometimes a third and subsequent level of metallization. Interlevel dielectrics such as doped and undoped silicon dioxide (SiO.sub.2), are used to electrically isolate the different levels of metallization in a silicon substrate or well. The electrical connections between different interconnection levels are made through the use of metallized vias. U.S. Pat. No. 4,789,648, which is incorporated herein by reference, describes a method for preparing multiple metallized layers and metallized vias in insulator films. In a similar manner, metal contacts are used to form electrical connections between interconnection levels and devices formed in a well. The metal vias and contacts may be filled with various metals and alloys including titanium (Ti), titanium nitride (TiN), tantalum (Ta), aluminum copper (Al--Cu), aluminum silicon (Al--Si), copper (Cu), tungsten (W), and combinations thereof. The metal vias and contacts generally employ an adhesion layer such as titanium nitride (TiN) and/or titanium (Ti) to adhere the metal layer to the SiO.sub.2 substrate. At the contact level, the adhesion layer acts as a diffusion barrier to prevent the filled metal and SiO.sub.2 from reacting.

In one semiconductor manufacturing process, metallized vias or contacts are formed by a blanket metal deposition followed by a chemical mechanical polish (CMP) step. In a typical process, via holes are etched through an interlevel dielectric (ILD) to interconnection lines or to a semiconductor substrate. Next, a thin adhesion layer such as titanium nitride and/or titanium is generally formed over the ILD and is directed into the etched via hole. Then, a metal film is blanket deposited over the adhesion layer and into the via hole. Deposition is continued until the via hole is filled with the blanket deposited metal. Finally, the excess metal is removed by chemical mechanical polishing, (CMP) to form metal vias. Processes for manufacturing and/or CMP of ILD's are disclosed in U.S. Pat. Nos. 4,671,851, 4,910,155 and 4,944,836.

In a typical chemical mechanical polishing process, the substrate is placed in direct contact with a rotating polishing pad. A carrier applies pressure against the backside of the substrate. During the polishing process, the pad and table are rotated while a downward force is maintained against the substrate back. An abrasive and chemically reactive solution, commonly referred to as a "slurry" is applied to the pad during polishing. The slurry initiates the polishing process by chemically reacting with the film being polished. The polishing process is facilitated by the rotational movement of the pad relative to the

substrate as slurry is provided to the wafer/pad interface. Polishing is continued in this manner until the desired film on the insulator is removed.

The slurry composition is an important factor in the CMP step. Depending on the choice of the oxidizing agent, the abrasive, and other useful additives, the polishing slurry can be tailored to provide effective polishing to metal layers at desired polishing rates while minimizing surface imperfections, defects and corrosion and erosion. Furthermore, the polishing slurry may be used to provide controlled polishing selectivities to other thin-film materials used in current integrated circuit technology such as titanium, titanium nitride and the like.

Typically CMP polishing slurries contain an abrasive material, such as silica or alumina, suspended in an oxidizing, aqueous medium. For example, U.S. Pat. No. 5,244,534 to Yu et al. reports a slurry containing alumina, hydrogen peroxide, and either potassium or ammonium hydroxide that is useful to remove tungsten at predictable rates with little removal of the underlying insulating layer. U.S. Pat. No. 5,209,816 to Yu et al. discloses a slurry comprising perchloric acid, hydrogen peroxide and a solid abrasive material in an aqueous medium that is useful for polishing aluminum. U.S. Pat. No. 5,340,370 to Cadien and Feller discloses a tungsten polishing slurry comprising approximately 0.1M potassium ferricyanide, approximately 5 weight percent silica and potassium acetate. Acetic acid is added to buffer the pH at approximately 3.5.

U.S. Pat. No. 4,789,648 to Beyer et al. discloses a slurry formulation using alumina abrasives in conjunction with sulfuric, nitric, and acetic acids and deionized water. U.S. Pat. Nos. 5,391,258 and 5,476,606 disclose slurries for polishing a composite of metal and silica which includes an aqueous medium, abrasive particles and an anion which controls the rate of silica removal. Other polishing slurries for use in CMP applications are described in U.S. Pat. No. 5,527,423 to Neville et al., U.S. Pat. No. 5,354,490 to Yu et al., U.S. Pat. No. 5,340,370 to Cadien et al., U.S. Pat. No. 5,209,816 to Yu et al., U.S. Pat. No. 5,157,876 to Medellin, U.S. Pat. No. 5,137,544 to Medellin, and U.S. Pat. No. 4,956,313 to Cote et al.

It has been recognized that CMP slurries that are used to polish multiple metal layers in a single step typically exhibit a low polishing rate towards at least one of the metal layers. As a result, the polishing step is lengthened or operated at aggressive polishing conditions that can cause undesirable erosion of the SiO.sub.2 layer and recessing of the metal vias and/or metal lines. Such recessing causes a non-planar via layer or metal line layer to be formed which impairs the ability to print high resolution lines during subsequent photolithography steps and can cause the formation of voids or open circuits in the formed metal interconnections. Additionally, recessing increases when over polishing is used to ensure complete removal of the titanium, titanium nitride, and aluminum films across the surface of a wafer. Thus, a need remains for CMP slurries which reliably polish a plurality of metal layers including a titanium layer in an integrated circuit. Accordingly, a new CMP polishing slurry that polishes titanium at a higher rate is needed to overcome the present substrate manufacturing reliability issues.

SUMMARY OF THE INVENTION

The present invention is directed to a single chemical mechanical polishing slurry that is able to polish aluminum alloy, titanium, and titanium nitride layers at acceptable rates.

In addition, the chemical mechanical polishing slurry has a low insulator polishing selectivity while exhibiting high polishing selectivities towards titanium, titanium nitride, and aluminum.

Furthermore, this invention is directed to methods for using a single chemical mechanical polishing slurry to polish a plurality of metal layers in an integrated circuit.

In one embodiment, this invention is an aqueous chemical mechanical polishing slurry. The chemical mechanical polishing slurry comprises an abrasive, from about 0.2 to about 10.0 weight percent of a first oxidizer, from about 0.5 to about 10.0 weight percent of a second oxidizer, and from about 0.5 to about 3.0 weight percent of at least one organic acid. The chemical mechanical polishing slurry should have a pH of from about 2.0 to about 8.0.

In another embodiment, this invention is an aqueous chemical mechanical polishing slurry. The chemical mechanical polishing slurry comprises alumina, from about 0.2 to about 10.0 weight percent ammonium persulfate, from about 0.5 to about 10.0 weight percent hydrogen peroxide, and from about 0.5 to about 3.0 succinic acid. Furthermore, the pH of the chemical mechanical polishing slurry ranges from about 2.0 to about 8.0.

In still another embodiment, this invention is a method for polishing a substrate. The method includes admixing an abrasive, from about 0.2 to about 10.0 weight percent of a first oxidizer, from about 0.5 to about 10.0 weight percent of a second oxidizer, from about 0.5 to about 3.0 weight percent of at least one organic acid, and deionized water to give a chemical mechanical polishing slurry. Next, the chemical mechanical polishing slurry is applied to the substrate and at least a portion of a titanium layer, at least a portion of a titanium nitride adhesion layer and at least a portion of an aluminum alloy containing layer associated with the substrate are removed by bringing a pad into contact with the substrate and moving the pad in relation to the substrate.

DETD DESCRIPTION OF THE CURRENT EMBODIMENT

The present invention relates to a chemical mechanical polishing slurry that comprises an abrasive and at least two oxidizers. The chemical mechanical polishing slurry is used to polish at least one metal layer associated with a substrate selected from the group including integrated circuits, thin films, multiple level semiconductors, and wafers. In particular, the chemical mechanical polishing slurry of this invention has been found to exhibit excellent polishing selectivities when used to polish a substrate including titanium, titanium nitride, and aluminum alloy containing layers in a single step, multiple metal layer chemical mechanical polishing process.

Before describing the details of the various preferred embodiments of this invention, some of the terms that are used herein will be defined. The chemical mechanical polishing slurry, ("CMP slurry"), is a useful product of this invention that comprises an at least two oxidizing agents, an abrasive, an organic acid, and other optional ingredients. The CMP slurry is useful for polishing a multiple level metallization which may include but are not limited to semiconductor thin-films, integrated circuit thin-films, and for any other films and surfaces where CMP processes are useful. The terms "aluminum" and "aluminum containing alloys" are used interchangeably herein as it is within the understanding of one of skill in the art that pure aluminum is a poor

conductor and that most "aluminum" containing metallization layers are actually comprised of an aluminum containing alloy, such as Al--Cu, that are good conductors.

The oxidizing agents useful in the chemical mechanical polishing slurry are incorporated into a CMP slurry to aid in oxidizing the multiple metal layers to their corresponding oxide, hydroxide, or ions. For example, in the present invention, the oxidizing agents may be used to oxidize a metal layer to its corresponding oxide or hydroxide, e.g., titanium to titanium oxide, tungsten to tungsten oxide, copper to copper oxide, and aluminum to aluminum oxide. The oxidizing agents of this invention are useful when incorporated into a polishing slurry to polish metals and metal based components including titanium, titanium nitride, tantalum, copper, tungsten, aluminum, and aluminum alloys such as aluminum/copper alloys, and various mixtures and combinations thereof by mechanically polishing the metals to remove the respective oxide layer.

The CMP slurry of this invention includes at least two oxidizers. The first oxidizer is selected from peroxy compounds which may disassociate through hydroxy radicals. Such oxidizers exhibit good polishing selectivity towards titanium. Non-exclusive examples of such peroxy compounds include peracetic acid, urea hydrogen peroxide, sodium peroxide, perboric acid, sodium percarbonate, and hydrogen peroxide, with hydrogen peroxide being the preferred first oxidizer. The first oxidizer may be present in the overall chemical mechanical polishing slurry in an amount ranging from about 0.5 to about 10.0 weight percent. It is preferred that the first oxidizer is present in the slurry in an amount ranging from about 1.0 to about 6.0 weight percent and most preferably from about 2.0 to about 4.0 weight percent.

The CMP slurry of this invention includes a second oxidizer. The second oxidizer should be capable of CMP polishing of aluminum and aluminum containing alloy metal layers with good selectivities. The second oxidizer is selected from dipersulfate and monopersulfate compounds. Ammonium persulfate is a preferred second oxidizer. The second oxidizer may be present in the chemical mechanical polishing slurry in an amount ranging from about 0.2 to about 10.0 weight percent. More preferably, the second oxidizer will be present in the chemical mechanical polishing slurry in an amount ranging from about 2.0 to about 8.0 weight percent with a range of from about 3.0 to about 5.0 being most preferred.

The CMP slurry of this invention includes an abrasive. The abrasive is typically a metal oxide abrasive. The metal oxide abrasive may be selected from the group including alumina, titania, zirconia, germania, silica, ceria and mixtures thereof. The CMP slurry of this invention preferably includes from about 1.0 to about 9.0 weight percent or more of an abrasive. It is more preferred, however, that the CMP slurry of this invention includes from about 3.0 to about 6.0 weight percent abrasive.

The metal oxide abrasive may be produced by any techniques known to those skilled in the art. Metal oxide abrasives can be produced using any high temperature process such as sol-gel, hydrothermal or, plasma process, or by processes for manufacturing fumed or precipitated metal oxides. Preferably, the metal oxide is a fumed or precipitated abrasive and, more preferably it is a fumed abrasive such as fumed silica or fumed alumina. For example, the production of fumed metal oxides is a well-known process which involves the hydrolysis of suitable feedstock vapor (such as aluminum chloride for an alumina abrasive) in a flame of hydrogen and oxygen. Molten particles of roughly spherical shapes are formed in the combustion process, the diameters of which are varied through process parameters. These molten spheres of alumina or similar

oxide, typically referred to as primary particles, fuse with one another by undergoing collisions at their contact points to form branched, three dimensional chain-like aggregates. The force necessary to break aggregates is considerable and often considered irreversible. During cooling and collecting, the aggregates undergo further collision that may result in some mechanical entanglement to form agglomerates. Agglomerates are thought to be loosely held together by van der Waals forces and can be reversed, i.e., de-agglomerated, by proper dispersion in a suitable media.

Precipitated abrasives may be manufactured by conventional techniques such as by coagulation of the desired particles from an aqueous medium under the influence of high salt concentrations, acids or other coagulants. The particles are filtered, washed, dried and separated from residues of other reaction products by conventional techniques known to those skilled in the art.

A preferred metal oxide will have a surface area, as calculated from the method of S. Brunauer, P. H. Emmet, and I. Teller, J. Am. Chemical Society, Volume 60, Page 309 (1938) and commonly referred to as BET, ranging from about 5 m.sup.2 /g to about 430 m.sup.2 /g and preferably from about 30 m.sup.2 /g to about 170 m.sup.2 /g. Due to stringent purity requirements in the IC industry the preferred metal oxide should be of a high purity. High purity means that the total impurity content, from sources such as raw material impurities and trace processing contaminants, is typically less than 1% and preferably less than 0.01% (i.e., 100 ppm).

In this preferred embodiment, the metal oxide abrasive consists of metal oxide aggregates having a size distribution less than about 1.0 micron, a mean aggregate diameter less than about 0.4 micron and a force sufficient to repel and overcome the van der Waals forces between abrasive aggregates themselves. Such metal oxide abrasive has been found to be effective in minimizing or avoiding scratching, pit marks, divots and other surface imperfections during polishing. The aggregate size distribution in the present invention may be determined utilizing known techniques such as transmission electron microscopy (TEM). The mean aggregate diameter refers to the average equivalent spherical diameter when using TEM image analysis, i.e., based on the cross-sectional area of the aggregate. By force is meant that either the surface potential or the hydration force of the metal oxide particles must be sufficient to repel and overcome the van der Waals attractive forces between the particles.

In another preferred embodiment, the metal oxide abrasive may consist of discrete, individual metal oxide particles having a primary particle diameter less than 0.4 micron (400 nm) and a surface area ranging from about 10 m.sup.2 /g to about 250 m.sup.2 /g.

Preferably, the metal oxide abrasive is incorporated into the aqueous medium of the polishing slurry as a concentrated aqueous dispersion of metal oxides, which aqueous dispersion of metal oxide abrasives typically ranges from about 3% to about 45% solids, and preferably between 10% and 20% solids. The aqueous dispersion of metal oxides may be produced utilizing conventional techniques, such as slowly adding the metal oxide abrasive to an appropriate media, for example, deionized water, to form a colloidal dispersion. The dispersion is typically completed by subjecting it to high shear mixing conditions known to those skilled in the art. The pH of the slurry may be adjusted away from the isoelectric point to maximize colloidal stability.

The CMP slurry of this invention includes an organic acid. A wide range

of conventional organic acids, salts of organic acids, and mixtures thereof are useful in the CMP slurry of the present invention to enhance the selectivity to oxide polishing rate, such as monofunctional acids, di-functional acids, hydroxyl/carboxylate acids, chelating, non-chelating acids, and their salts. Preferably, the organic acid is selected from the group of acetic acid, adipic acid, butyric acid, capric acid, caproic acid, caprylic acid, citric acid, glutaric acid, glycolic acid, formic acid, fumaric acid, lactic acid, lauric acid, malic acid, maleic acid, malonic acid, myristic acid, oxalic acid, palmitic acid, phthalic acid, propionic acid, pyruvic acid, stearic acid, succinic acid, tartaric acid, valeric acid and derivatives, including salts thereof.

The organic acid or salt should be present in the final CMP slurry, individually or in combination with other organic acids or salts, in an amount sufficient to enhance the oxide selectivity without detrimentally effecting the stability of the CMP slurry. As such, the organic acid is typically present in the slurry from about 0.05% to 15% by weight, and preferably in a range between 0.5% and 5.0% by weight. Examples of chemical mechanical polishing slurries including organic acids and salts thereof are disclosed in U.S. Pat. Application Ser. No. 08/644,509 which is incorporated herein by reference. A preferred organic acid is succinic acid. Succinic acid has been found to promote passivation of aluminum and it also inhibits the removal of the dielectric layer.

Other well known polishing slurry additives may be incorporated into the chemical mechanical polishing slurry of this invention. One type of optional additives are inorganic acids and/or salts thereof which may be added to the polishing slurry to further improve or enhance the polishing rate of the barrier layers in the wafer, such as titanium and tantalum. Useful inorganic additives include sulfuric acid, phosphoric acid, nitric acid, ammonium salts, potassium salts, sodium salts or other cationic salts of sulfates and phosphates.

In order to promote stabilization of the polishing slurry including oxidizing agents against settling, flocculation and decomposition, a variety of optional additives, such as surfactants, stabilizers, or dispersing agents, can be used. If a surfactant is added to the CMP slurry, then it can be an anionic, cationic, nonionic, or amphoteric surfactant or a combination of two or more surfactants can be employed. Furthermore, it has been found that the addition of a surfactant may be useful to improve the within-wafer-non-uniformity (WIWNU) of the wafers, thereby improving the surface of the wafer and reducing wafer defects. Non-limiting examples of preferred stabilizers useful in the CMP slurry of this invention include but are not limited to phosphonic acids such as aminotri(methylenephosphonic) acid, 1-hydroxyethylidene-4-diphosphonic acid, hexamethylenediaminetetramethylene phosphonic acid, and diethylenetetramine pentamethylenephosphonic acid. One or more stabilizers may be present in the CMP slurry of this invention in an amount that is sufficient to produce measurable improvements in slurry stability, and generally in an amount ranging from about 100 ppm to about 5.0 weight percent.

In general, the amount of additive such as a surfactant that may be used in the present invention should be sufficient to achieve effective stearic stabilization of the slurry and will typically vary depending on the particular surfactant selected and the nature of the surface of the metal oxide abrasive. For example, if not enough of a selected surfactant is used, it will have little or no effect on stabilization. On the other hand, too much surfactant in the CMP slurry may result in undesirable foaming and/or flocculation in the slurry. As a result, stabilizers such as surfactants should generally be present in a range

between about 0.001% and 10% by weight. Furthermore, the additive may be added directly to the slurry or treated onto the surface of the metal oxide abrasive utilizing known techniques. In either case, the amount of additive is adjusted to achieve the desired concentration in the polishing slurry.

Stabilizers most useful in the CMP slurry of this invention are phosphonic acids and salts thereof. A most preferred phosphonic acid stabilizer is aminotrimethylene phosphonic acid. A phosphonic acid stabilizer may be present in the CMP slurry of this invention in an amount ranging from about 0.01 to about 5.0 weight percent. The addition of one or more phosphonic acids to the CMP slurry of this invention may also inhibit metallic corrosion.

It is desirable to maintain the pH of the CMP slurry of this invention within a range of from about 2.0 to about 8, and preferably between from about 3.5 to about 6 in order to facilitate control of the CMP process. Specifically, it has been observed that the metal surface film passivation capability of the CMP slurry of this invention is compromised at high pH's, e.g., greater than 8. Likewise, slurry handling problems and substrate polishing quality problems are encountered when the pH of the CMP slurry of this invention is too low, e.g., less than 2. The pH of the CMP slurry of this invention may be adjusted using any known acid, base, or amine. However, the use of an acid or base that contains no metal ions, such as ammonium hydroxide and amines, or nitric, phosphoric, sulfuric, or organic acids are preferred to avoid introducing undesirable metal components into the CMP slurry of this invention.

The chemical mechanical polishing slurry of this invention has been found to have a high titanium (Ti) polishing rate as well as a high polishing rates towards titanium nitride (TiN) an aluminum containing layer and especially towards an Al--Cu metal layer. In addition, the chemical mechanical polishing slurry exhibits desirable low polishing rates towards the dielectric insulating layer.

One important application for the chemical mechanical polishing slurry of this invention is as a chemical mechanical polish for thin layer films comprising titanium, aluminum and aluminum containing alloys such as Al--Cu. In such a polishing application, the single polishing slurry is effective to polish titanium, titanium nitride, and aluminum alloy containing layers. The CMP slurry of this invention preferably exhibit a Al--Cu to titanium [Al--Cu:Ti] polishing selectivity and a Al--Cu to TiN [Al--Cu:TiN] polishing selectivity of from about 2:1 to about 1:2 and preferably from about 1:1.25 to about 1.25:1. At the same time the CMP slurry of this invention exhibits a very low dielectric (SiO.sub.2) polishing rate and preferably an SiO.sub.2 polishing rate less than 40.ANG./min.

The CMP slurry may be produced using conventional techniques known to those skilled in the art. Typically, the oxidizing agent and any optional additives, are mixed into the aqueous medium, such as deionized or distilled water, at pre-determined concentrations under low shear conditions until such components are completely dissolved in the medium. A concentrated dispersion of the metal oxide abrasive, such as fumed alumina, is added to the medium and diluted to the desired loading level of abrasive in the final CMP slurry.

The CMP slurries of the present invention may be supplied as one package system (oxidizing agents, abrasive, and additives in a stable aqueous medium). To avoid possible CMP slurry degradation, however, it is preferred that at least a two package system is used where the first

package comprises the first oxidizer and the second package comprises the second oxidizer. The remaining components, the abrasive, the organic acid, and any optional additives may be placed in either the first container, the second container or in a third container. Furthermore, the components in the first container or second container may be in dry form while the components in the corresponding container are in the form of an aqueous dispersion. For example, the first container may comprise the first oxidizer in aqueous form while the second container comprises an aqueous dispersion of the abrasive the second oxidizer and the organic acid. Alternately, the first container may comprise an aqueous dispersion of an abrasive and the first oxidizer while the second container may comprise the organic acid and the second oxidizer in aqueous form. Other two-container combinations of the ingredients of the CMP slurry of this invention are within the knowledge of one having ordinary skill in the art. It is preferred that the first oxidizer and the second oxidizer are held in separate containers as they may degrade over time when combined unless they are stored at low temperatures, e.g., 10.degree. C. or less.

A multi-package CMP slurry system may be used with any standard polishing equipment appropriate for use on the desired metal layer of the wafer. The multi-package system includes one or more CMP slurry components in aqueous or dry form in two or more containers. The multi-package system is used by combining the components from the various containers in the desired amounts to give a CMP slurry comprising at least two oxidizing agents, an abrasive, and an organic acid in amounts described above.

The CMP slurry of the present invention does not significantly increase the silicon dioxide polishing rate above about 40.ANG./min. However, the CMP slurry of this invention significantly increases the polishing rate of titanium or titanium nitride while maintaining a high polishing rate towards aluminum and aluminum containing alloys such as Al--Cu. Thus, the CMP slurry of this invention is effective in controlling polishing selectivities of titanium, titanium nitrite and Al--Cu. The polishing slurry of the present invention may be used during the various stages of semiconductor integrated circuit manufacture to provide effective polishing at desired polishing rates while minimizing surface imperfections and defects.

EXAMPLES

We have discovered that a CMP slurry including two oxidizers is capable of polishing a multiple metal layer comprising titanium, titanium nitride, and Al--Cu at high rates while exhibiting an acceptable low polishing rate towards the dielectric layer.

The following examples illustrate preferred embodiments of this invention as well as preferred methods for using compositions of this invention.

Example 1

In this example, CMP polishing was accomplished using two CMP slurries including 4.0 weight percent ammonium persulfate, 3.0 weight percent succinic acid, 5.0 weight percent of a fumed alumina abrasive, WA-355, manufactured by the Microelectronics Materials Division of Cabot Corporation, in Tuscola, Ill. and sold under the trademark SEMI-SPERSE.RTM., and either 0 or 3.0 weight percent hydrogen peroxide with the remainder of the slurry consisting of deionized water. The slurry was adjusted to a pH of 5.0 with ammonium hydroxide.

The CMP slurry was applied to Ti coated blanket wafers. The wafers were placed in an IPEC 472 tool manufactured by IPEC Planar. The wafers were subjected to 5 psi down force, a table speed of 45 rpm, and a spindle speed of 60 rpm. The CMP slurry was applied to a XMGH 1158 pad manufactured by Rodel, Inc. at a rate of 200 ml/min.

The titanium removal rate for the CMP slurry containing no hydrogen peroxide was 8.6 nm/min and the titanium/Al--Cu selectivity was 40.7. The titanium removal rate for the CMP slurry containing 3.0 weight percent hydrogen peroxide was 200 nm/min and the titanium/Al--Cu selectivity was 1:1. In both tests the Al--Cu removal rate was about 200 nm/min.

Example 2

This example studies the effect of varying solution pH on the aluminum polishing rates and Ti, TiN, and SiO.sub.2 selectivities of a CMP slurry of this invention. This example used a CMP slurry of this invention having the following composition; 4.0 weight percent ammonium persulfate; 3.0 weight percent succinic acid; 3.0 weight percent hydrogen peroxide; 5.0 weight percent alumina abrasive (WA-355) with the remainder being deionized water. The pH of the slurry was adjusted using ammonium hydroxide to give two slurries; the first with a pH of 3.5 and the second with a pH of 5.0.

The CMP slurry was applied to Al, Ti, TiN, and SiO.sub.2 blanket coated wafers. The wafers were placed in a IPEC 472 tool and polished using a 5 psi down force, a table speed of 45 rpm, and a spindle speed of 60 rpm. The CMP slurry was applied to a XMGH1158 pad at a rate of 200 ml/min. Table 1, below summarizes the results of this example.

TABLE 1

	pH 3.5	pH 5.0
Al removal rate:	350 nm/min	600 nm/min
Al WIWNU	7.6%	14%
Sel. to Ti	1.72:1	1.61:1
Sel. to TiN	1.79:1	3.9:1
Sel. to SiO.sub.2	88:1	n/m
Dishing, 50 .mu.m*	57 nm	40.5 nm
Dishing, 128 .mu.m**	198 nm	164 nm
Erosion	65 nm	54 nm

*the result is based on initial feature depth of 750 nm covered with 1.5 .mu.m of AlCu.
**the result is based on initial feature depth of 750 nm covered with 0.8 .mu.m of AlCu.

The polishing results, set forth in Table 1, above, clearly show that the CMP slurry of this invention is useful over a wide pH range.

Example 3

This example investigates the effect of the addition of phosphonic acids to a CMP slurry of this invention on titanium dissolution. A CMP slurry consisting of 4.0 weight percent ammonium persulfate, 3.0 weight percent

succinic acid, 3.0 weight percent hydrogen peroxide, 5.0 weight percent alumina abrasive (WA-355), and deionized water was used in this example. The CMP slurry, with and without the addition of small amounts of aminotri(methylenephosphonic acid)) was introduced into an electrochemical cell, and the Ti dissolution rate of the freshly abraded surface was evaluated by electrochemical techniques five minutes after abrasion had ceased. The results of the tests are set forth in Table 2 immediately below:

TABLE 2

Slurry pH	% Phosphonic Acid	Ti Dissolution Rate (.ANG./min)
3.5	0	3.4
5.0	0	6.0
5.0	0.1	3.0
5.0	0.5	1.3
5.0	1.0	1.0
8.05	0	68
8.05	1.0	3.4

The results of these examples demonstrate that a CMP slurrying including a first oxidizer and a second oxidizer is useful, over a wide range of pH's in polishing multiple layers of metallization in a single polishing step. The results also demonstrate that the addition of a stabilizer to a CMP slurry of this invention inhibits corrosion of a metal layer of a metal substrate.

While the present invention has been described by means of specific embodiments, it will be understood that modifications may be made without departing from the spirit of the invention. The scope of the invention is not to be considered as limited by the description of the invention set forth in the specification and examples, but rather as defined by the following claims.

CLM What is claimed is:

1. A chemical mechanical polishing slurry comprising: an aqueous medium of; an abrasive; from about 0.2 to about 10.0 weight percent of a first oxidizer; from about 0.5 to about 10.0 weight percent of a second oxidizer; and from about 0.5 to about 15.0 weight percent of at least one organic acid, wherein the pH of the chemical mechanical polishing slurry ranges from about 2.0 to about 8.0.

2. The chemical mechanical polishing slurry of claim 1 wherein the first oxidizer is at least one peroxy compound which may disassociate through hydroxyl radicals.

3. The chemical mechanical polishing slurry of claim 2 wherein the first oxidizer is hydrogen peroxide.

4. The chemical mechanical polishing slurry of claim 1 wherein the second oxidizer is at least one dipersulfate salt or acid or monopersulfate salt or acid.

5. The chemical mechanical polishing slurry of claim 4 wherein the second oxidizer is ammonium persulfate.

6. The chemical mechanical polishing slurry of claim 1 wherein the abrasive is a metal oxide.

7. The chemical mechanical polishing slurry of claim 5 wherein the metal oxide abrasive is selected from the group including alumina, ceria, germania, silica, titania, zirconia, and mixtures thereof.

8. The chemical mechanical polishing slurry of claim 1 wherein the abrasive is an aqueous dispersion of a metal oxide.

9. The chemical mechanical polishing slurry of claim 7 wherein the metal oxide abrasive consists of metal oxide aggregates having a size distribution less than about 1.0 micron and a mean aggregate diameter less than about 0.4 micron.

10. The chemical mechanical polishing slurry of claim 7 wherein the metal oxide abrasive consists of discrete, individual metal oxide spheres having a primary particle diameter less than 0.400 micron and a surface area ranging from about 10 m.sup.2 /g to about 250 m.sup.2 /g.

11. The chemical mechanical polishing slurry of claim 1 wherein the abrasive has a surface area ranging from about 5 m.sup.2 /g to about 430 m.sup.2 /g.

12. The chemical mechanical polishing slurry of claim 11 wherein the abrasive has a surface area of from about 30 m.sup.2 /g to about 170 m.sup.2 /g.

13. The chemical mechanical polishing slurry of claim 7 wherein the abrasive is selected from the group consisting of precipitated abrasives or fumed abrasives.

14. The chemical mechanical polishing slurry of claim 13 wherein the abrasive is selected from the group consisting of silica, alumina, and mixtures thereof.

15. The chemical mechanical polishing slurry of claim 1 wherein the organic acid is succinic acid.

16. The chemical mechanical polishing slurry of claim 1 further including a surfactant.

17. The chemical mechanical polishing slurry of claim 1 further including a stabilizer.

18. A chemical mechanical polishing slurry comprising: an aqueous medium; from about 1.0 to about 9.0 weight percent alumina; from about 0.5 to about 10.0 weight percent hydrogen peroxide; from about 0.2 to about 10.0 weight percent ammonium persulfate; and from about 0.5 to about 5.0 weight percent succinic acid, wherein the pH of the chemical mechanical polishing slurry ranges from about 2.0 to about 8.0.

19. The chemical mechanical polishing slurry of claim 18 wherein hydrogen peroxide is present in the composition in an amount ranging from about 1.0 to about 6.0 weight percent.

20. The chemical mechanical polishing slurry of claim 18 wherein ammonium persulfate is present in the composition in an amount ranging from about 2.0 to about 8.0 weight percent.

21. The chemical mechanical polishing slurry of claim 18 wherein the alumina is present in the composition in an amount ranging from about 3.0 to about 6.0 weight percent.

22. The chemical mechanical polishing slurry of claim 18 including from about 100 ppm to about 5.0 weight percent of a stabilizer.

23. The chemical mechanical polishing slurry of claim 18 having a Ti/Al--Cu selectivity of from about 1:2 to about 2:1.

24. A method for polishing a substrate including at least one metal layer comprising the steps of: (a) admixing, from about 1.0 to about 9.0 weight percent of an abrasive, from about 0.2 to about 10.0 weight percent of a first oxidizer, from about 0.5 to about 10.0 weight percent of a second oxidizer, from about 0.5 to about 3.0 weight percent of at least one organic acid, and deionized water to give a chemical mechanical polishing slurry; (b) applying the chemical mechanical polishing slurry to the substrate; and (c) removing at least a portion of the metal layer from the substrate by bringing a pad into contact with the substrate and moving the pad in relation to the substrate.

25. The method of claim 24 wherein the substrate includes a titanium adhesion layer and an aluminum alloy containing layer and wherein at least a portion of the titanium layer and at least a portion of the aluminum alloy containing layer are removed in step (c).

26. The method of claim 24 wherein the substrate further includes a titanium nitride layer wherein at least a portion of the titanium nitride layer is removed in step (c).

27. The method of claim 24 wherein the chemical mechanical polishing slurry is applied to the pad before the pad is placed into contact with the substrate.

28. The method of claim 24 wherein the first oxidizer is at least one peroxy compound that may disassociate through hydroxyl radicals.

29. The method of claim 28 wherein the first oxidizer is hydrogen peroxide.

30. The method of claim 24 wherein the second oxidizer is at least one dipersulfate salt or acid or monopersulfate salt or acid.

31. The method of claim 30 wherein the second oxidizer is ammonium persulfate.

32. The method of claim 24 wherein the abrasive is a metal oxide.

33. The method of claim 32 wherein the metal oxide abrasive is selected from the group including alumina, ceria, germania, silica, titania, zirconia, and mixtures thereof.

34. The method of claim 24 wherein the abrasive is an aqueous dispersion of a metal oxide.

35. The method of claim 34 wherein the metal oxide abrasive is selected from the group consisting of precipitated alumina, fumed alumina, precipitated silica, fumed silica, and mixtures thereof.

36. The method of claim 24 wherein the organic acid is succinic acid.

37. A method for polishing a substrate including a titanium adhesion layer, a titanium nitride layer and an aluminum alloy containing layer comprising: (a) admixing, hydrogen peroxide, ammonium persulfate, succinic acid, and alumina with deionized water to give a mechanical chemical polishing slurry comprising from about from about 1.0 to about

9.0 weight percent alumina, from about 0.2 to about 10.0 weight percent ammonium persulfate, from about 0.5 to about 10.0 weight percent hydrogen peroxide, and from about 0.5 to about 3.0 succinic acid, wherein the pH of the chemical mechanical polishing slurry ranges from about 2.0 to about 8.0 and wherein the titanium to aluminum alloy polishing selectivity ranges from about 2:1 to about 1:2; (b) applying the chemical mechanical polishing slurry to the substrate; and (c) removing a least a portion of the titanium adhesion layer, at least a portion of the titanium nitride layer and at least a portion of the aluminum alloy layer by bringing a pad into contact with the substrate and moving the pad in relation to the substrate.

38. The method of claim 24 wherein the substrate is selected from the group consisting of integrated circuits, thin films, multiple level semiconductors, and wafers.

INCL INCLM: 438/692.000
INCLS: 438/693.000; 252/079.200; 051/308.000; 051/309.000; 106/003.000
NCL NCLM: 438/692.000
NCLS: 051/308.000; 051/309.000; 106/003.000; 252/079.200; 438/693.000
IC [6]
ICM: B44C001-22
EXF 438/692; 438/693; 252/79.2; 051/308; 051/309; 106/3
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it is available.
The MAX format is the same as ALL.
The IALL format is the same as ALL with BIB ABS and IND indented,
with text labels.

For additional information, please consult the following help
messages:

HELP DFIELDS -- To see a complete list of individual display fields.
HELP FORMATS -- To see detailed descriptions of the predefined formats.
ENTER DISPLAY FORMAT (IDE):end

=> d hitstr
'HITSTR' IS NOT A VALID FORMAT FOR FILE 'REGISTRY'

The following are valid formats:

Substance information can be displayed by requesting individual
fields or predefined formats.  The predefined substance formats
are:  (RN = CAS Registry Number)

REG     - RN
SAM     - Index Name, MF, and structure - no RN
```

```
FIDE   - All substance data, except sequence data
IDE    - FIDE, but only 50 names
SQIDE  - IDE, plus sequence data
SQIDE3 - Same as SQIDE, but 3-letter amino acid codes are used
SQD    - Protein sequence data, includes RN
SQD3   - Same as SQD, but 3-letter amino acid codes are used
SQN    - Protein sequence name information, includes RN

CALC   - Table of calculated properties
EPROP  - Table of experimental properties
PROP   - EPROP and CALC

Any CA File format may be combined with any substance format to
obtain CA references citing the substance.  The substance formats
must be cited first.  The CA File predefined formats are:

ABS  -- Abstract
APPS -- Application and Priority Information
BIB  -- CA Accession Number, plus Bibliographic Data
CAN  -- CA Accession Number
CBIB -- CA Accession Number, plus Bibliographic Data (compressed)
IND  -- Index Data
IPC  -- International Patent Classification
PATS -- PI, SO
STD  -- BIB, IPC, and NCL

IABS --ABS, indented, with text labels
IBIB -- BIB, indented, with text labels
ISTD -- STD format, indented

OBIB -------- AN, plus Bibliographic Data (original)
OIBIB ------- OBIB, indented with text labels

SBIB -------- BIB, no citations
SIBIB ------- IBIB, no citations

The ALL format gives FIDE BIB ABS IND RE, plus sequence data when
it is available.
The MAX format is the same as ALL.
The IALL format is the same as ALL with BIB ABS and IND indented,
with text labels.

For additional information, please consult the following help
messages:

HELP DFIELDS -- To see a complete list of individual display fields.
HELP FORMATS -- To see detailed descriptions of the predefined formats.
ENTER DISPLAY FORMAT (IDE):end

=> file caplus
COST IN U.S. DOLLARS                          SINCE FILE      TOTAL
                                                   ENTRY    SESSION
FULL ESTIMATED COST                                64.90      75.09

FILE 'CAPLUS' ENTERED AT 14:25:10 ON 12 MAY 2003
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FILE COVERS 1907 - 12 May 2003 VOL 138 ISS 20
FILE LAST UPDATED: 11 May 2003 (20030511/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

=> d his

(FILE 'HOME' ENTERED AT 14:19:04 ON 12 MAY 2003)

FILE 'REGISTRY' ENTERED AT 14:19:13 ON 12 MAY 2003
E AMINOTRIMETHYLENEPHOSPHONIC/CN

FILE 'USPATFULL' ENTERED AT 14:21:02 ON 12 MAY 2003
L1 1 S US5783489/PN

FILE 'CAPLUS' ENTERED AT 14:22:04 ON 12 MAY 2003
L2 0 S US5783489/PN

FILE 'REGISTRY' ENTERED AT 14:22:53 ON 12 MAY 2003
L3 0 S AMINO/CNS AND TRI/CNS AND METHLENE/CNS AND PHOSPHONIC/CNS ACI
L4 0 S AMINO/CNS AND TRI/CNS AND METHYLENE/CNS AND PHOSPHONIC/CNS AC
L5 3 S AMINO/CNS AND TRI/CNS AND METHYLENE/CNS AND PHOSPHONIC/CNS AN

FILE 'CAPLUS' ENTERED AT 14:25:10 ON 12 MAY 2003

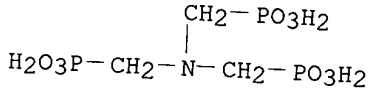
=> s l5
L6 44 L5

=> s l1 and l6
0 US5783489/PN
L7 0 L1 AND L6

=> d hitstr
L7 HAS NO ANSWERS
L1 1 SEA FILE=USPATFULL US5783489/PN
L5 3 SEA FILE=REGISTRY AMINO/CNS AND TRI/CNS AND METHYLENE/CNS AND PHOSPHONIC/CNS AND ACID/CNS
L6 44 SEA FILE=CAPLUS L5
L7 0 SEA FILE=CAPLUS L1 AND L6

=> d l6 hitstr

L6 ANSWER 1 OF 44 CAPLUS COPYRIGHT 2003 ACS
IT **20592-85-2**
RL: TEM (Technical or engineered material use); USES (Uses)
(bleaching of cellulose pulp with peroxide compds. in presence of a scale inhibitor used as stabilizer)
RN 20592-85-2 CAPLUS
CN Phosphonic acid, [nitrilotris(methylene)]tris-, sodium salt (9CI) (CA INDEX NAME)



●x Na

```
=> d his

     (FILE 'HOME' ENTERED AT 12:01:33 ON 12 MAY 2003)

     FILE 'REGISTRY' ENTERED AT 12:02:16 ON 12 MAY 2003
                E PHOSPHONOMETHYLIMINODIACETIC  ACID/CN
L1            0 S E3
                E N-PHOSPHONOMETHYLIMINODIACETIC  ACID/CN
                E N-PHOSPHONOMETHYLIMINODIACETIC/CN
                E PHOSPHONOMETHYLIMINODIACETIC/CN
L2            0 S E3
                E N-PHOSPHONOMETHYLIMINODIACETIC  ACID/CN
L3            0 S E3
                E ACETODISPHONIC ACID/CN
                E METHYLAMINO DIMETHYLENE PHOSPHONIC ACID/CN
L4            1 S PHOSPHONOMETHYLIMINOACETIC ACID/CN
                E  N-PHOSPHONOMETHYLIMINODIACETIC ACID/CN

     FILE 'REGISTRY' ENTERED AT 12:32:32 ON 12 MAY 2003
                E  N-PHOSPHONOMETHYLIMINODIACETIC ACID/CN
L5            4 S  N-PHOSPHONOMETHYLIMINODIACETIC ACID

=>
```

Connecting via Winsock to STN

Welcome to STN International! Enter x:x

LOGINID:sssptal600LUE

PASSWORD:
TERMINAL (ENTER 1, 2, 3, OR ?):2

* * * * * * * * * * Welcome to STN International * * * * * * * * * *

NEWS 1		Web Page URLs for STN Seminar Schedule - N. America
NEWS 2	Apr 08	"Ask CAS" for self-help around the clock
NEWS 3	Jun 03	New e-mail delivery for search results now available
NEWS 4	Aug 08	PHARMAMarketLetter(PHARMAML) - new on STN
NEWS 5	Aug 19	Aquatic Toxicity Information Retrieval (AQUIRE) now available on STN
NEWS 6	Aug 26	Sequence searching in REGISTRY enhanced
NEWS 7	Sep 03	JAPIO has been reloaded and enhanced
NEWS 8	Sep 16	Experimental properties added to the REGISTRY file
NEWS 9	Sep 16	CA Section Thesaurus available in CAPLUS and CA
NEWS 10	Oct 01	CASREACT Enriched with Reactions from 1907 to 1985
NEWS 11	Oct 24	BEILSTEIN adds new search fields
NEWS 12	Oct 24	Nutraceuticals International (NUTRACEUT) now available on STN
NEWS 13	Nov 18	DKILIT has been renamed APOLLIT
NEWS 14	Nov 25	More calculated properties added to REGISTRY
NEWS 15	Dec 04	CSA files on STN
NEWS 16	Dec 17	PCTFULL now covers WP/PCT Applications from 1978 to date
NEWS 17	Dec 17	TOXCENTER enhanced with additional content
NEWS 18	Dec 17	Adis Clinical Trials Insight now available on STN
NEWS 19	Jan 29	Simultaneous left and right truncation added to COMPENDEX, ENERGY, INSPEC
NEWS 20	Feb 13	CANCERLIT is no longer being updated
NEWS 21	Feb 24	METADEX enhancements
NEWS 22	Feb 24	PCTGEN now available on STN
NEWS 23	Feb 24	TEMA now available on STN
NEWS 24	Feb 26	NTIS now allows simultaneous left and right truncation
NEWS 25	Feb 26	PCTFULL now contains images
NEWS 26	Mar 04	SDI PACKAGE for monthly delivery of multifile SDI results
NEWS 27	Mar 19	APOLLIT offering free connect time in April 2003
NEWS 28	Mar 20	EVENTLINE will be removed from STN
NEWS 29	Mar 24	PATDPAFULL now available on STN
NEWS 30	Mar 24	Additional information for trade-named substances without structures available in REGISTRY
NEWS 31	Apr 11	Display formats in DGENE enhanced
NEWS 32	Apr 14	MEDLINE Reload
NEWS 33	Apr 17	Polymer searching in REGISTRY enhanced
NEWS 34	Apr 21	Indexing from 1947 to 1956 being added to records in CA/CAPLUS
NEWS 35	Apr 21	New current-awareness alert (SDI) frequency in WPIDS/WPINDEX/WPIX
NEWS 36	Apr 28	RDISCLOSURE now available on STN
NEWS 37	May 05	Pharmacokinetic information and systematic chemical names added to PHAR

NEWS EXPRESS April 4 CURRENT WINDOWS VERSION IS V6.01a, CURRENT MACINTOSH VERSION IS V6.0b(ENG) AND V6.0Jb(JP), AND CURRENT DISCOVER FILE IS DATED 01 APRIL 2003

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 NEWS HOURS     STN Operating Hours Plus Help Desk Availability
 NEWS INTER     General Internet Information
 NEWS LOGIN     Welcome Banner and News Items
 NEWS PHONE     Direct Dial and Telecommunication Network Access to STN
 NEWS WWW       CAS World Wide Web Site (general information)

Enter NEWS followed by the item number or name to see news on that
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  * * * * * * * * * * * * * * STN  Columbus  * * * * * * * * * * * * * * *



FILE 'HOME' ENTERED AT 12:01:33 ON 12 MAY 2003

=> registry
THIS COMMAND NOT AVAILABLE IN THE CURRENT FILE
Some commands only work in certain files.  For example, the EXPAND
command can only be used to look at the index in a file which has an
index.  Enter "HELP COMMANDS" at an arrow prompt (=>) for a list of
commands which can be used in this file.

=> file registry
COST IN U.S. DOLLARS                            SINCE FILE      TOTAL
                                                  ENTRY    SESSION
FULL ESTIMATED COST                                0.21       0.21

FILE 'REGISTRY' ENTERED AT 12:02:16 ON 12 MAY 2003
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STRUCTURE FILE UPDATES:   11 MAY 2003  HIGHEST RN 514167-89-6
DICTIONARY FILE UPDATES:  11 MAY 2003  HIGHEST RN 514167-89-6

TSCA INFORMATION NOW CURRENT THROUGH JANUARY 6, 2003

  Please note that search-term pricing does apply when
  conducting SmartSELECT searches.

Crossover limits have been increased.  See HELP CROSSOVER for details.

Experimental and calculated property data are now available.  See HELP
PROPERTIES for more information.  See STNote 27, Searching Properties
in the CAS Registry File, for complete details:
http://www.cas.org/ONLINE/STN/STNOTES/stnotes27.pdf

=> e phosphonomethyliminodiacetic  acid/cn
E1            1     PHOSPHONOMETHYLGLYCINE/CN
E2            1     PHOSPHONOMETHYLIMINOACETIC ACID/CN
E3            0 --> PHOSPHONOMETHYLIMINODIACETIC  ACID/CN
E4            1     PHOSPHONOMETHYLIMINODIACETIC ACID/CN
```
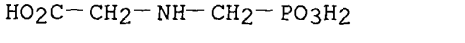

```
E5            1      PHOSPHONOMUTASE 2 (ESCHERICHIA COLI O157:H7 STRAIN EDL933 GE
                     NE PRPB)/CN
E6            1      PHOSPHONOMUTASE 2 (ESCHERICHIA COLI STRAIN O157:H7 GENE ECS0
                     385)/CN
E7            1      PHOSPHONOMUTASE, CARBOXYPHOSPHONOENOLPYRUVATE/CN
E8            1      PHOSPHONOMUTASE, CARBOXYPHOSPHONOENOLPYRUVATE (PHYSCOMITRELL
                     A PATENS CLONE 88_MM13_G11REV FRAGMENT)/CN
E9            1      PHOSPHONOMUTASE, CARBOXYPHOSPHONOENOLPYRUVATE (STREPTOMYCES
                     HYGROSCOPICUS CLONE PBS-BAM3 SUBUNIT REDUCED)/CN
E10           1      PHOSPHONOMUTASE, CARBOXYPHOSPHONOENOLPYRUVATE (STREPTOMYCES
                     HYGROSCOPICUS CLONE PMSB113 REDUCED)/CN
E11           1      PHOSPHONOMUTASE, CARBOXYPHOSPHONOENOLPYRUVATE (SULFOLOBUS SO
                     LFATARICUS GENE PRPB)/CN
E12           1      PHOSPHONOMYCIN/CN

=> s e3
L1            0 "PHOSPHONOMETHYLIMINODIACETIC  ACID"/CN

=> e N-phosphonomethyliminodiacetic  acid/cn
E1            1      N-PHOSPHONOMETHYLGLYCINE SODIUM SALT/CN
E2            1      N-PHOSPHONOMETHYLGLYCINE TRISODIUM SALT/CN
E3            0 --> N-PHOSPHONOMETHYLIMINODIACETIC  ACID/CN
E4            1      N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE DISODIUM SALT/CN
E5            1      N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE MONOSODIUM SALT/
                     CN
E6            1      N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE TETRASODIUM SALT
                     /CN
E7            1      N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE TRISODIUM SALT/C
                     N
E8            1      N-PHOSPHOPYRIDOXYL-.GAMMA.-AMINOBUTYRIC ACID/CN
E9            1      N-PHOSPHOPYRIDOXYL-GLYCINE/CN
E10           1      N-PHOSPHOPYRIDOXYL-L-ALANINE/CN
E11           1      N-PHOSPHORANYLIDENESILYLAMINE/CN
E12           1      N-PHOSPHORIBOSYLANTHRANILATE ISOMERASE-INDOLEGLYCEROL PHOSPH
                     ATE SYNTHETASE (BUCHNERA APHIDICOLA CLONE PBS2T-1 GENE TRPC(
                     F))/CN

=> e N-phosphonomethyliminodiacetic/cn
E1            1      N-PHOSPHONOMETHYLGLYCINE SODIUM SALT/CN
E2            1      N-PHOSPHONOMETHYLGLYCINE TRISODIUM SALT/CN
E3            0 --> N-PHOSPHONOMETHYLIMINODIACETIC/CN
E4            1      N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE DISODIUM SALT/CN
E5            1      N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE MONOSODIUM SALT/
                     CN
E6            1      N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE TETRASODIUM SALT
                     /CN
E7            1      N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE TRISODIUM SALT/C
                     N
E8            1      N-PHOSPHOPYRIDOXYL-.GAMMA.-AMINOBUTYRIC ACID/CN
E9            1      N-PHOSPHOPYRIDOXYL-GLYCINE/CN
E10           1      N-PHOSPHOPYRIDOXYL-L-ALANINE/CN
E11           1      N-PHOSPHORANYLIDENESILYLAMINE/CN
E12           1      N-PHOSPHORIBOSYLANTHRANILATE ISOMERASE-INDOLEGLYCEROL PHOSPH
                     ATE SYNTHETASE (BUCHNERA APHIDICOLA CLONE PBS2T-1 GENE TRPC(
                     F))/CN

=> e phosphonomethyliminodiacetic/cn
E1            1      PHOSPHONOMETHYLGLYCINE/CN
E2            1      PHOSPHONOMETHYLIMINOACETIC ACID/CN
E3            0 --> PHOSPHONOMETHYLIMINODIACETIC/CN
E4            1      PHOSPHONOMETHYLIMINODIACETIC ACID/CN
E5            1      PHOSPHONOMUTASE 2 (ESCHERICHIA COLI O157:H7 STRAIN EDL933 GE
```

```
                    NE PRPB)/CN
E6            1     PHOSPHONOMUTASE 2 (ESCHERICHIA COLI STRAIN O157:H7 GENE ECS0
                    385)/CN
E7            1     PHOSPHONOMUTASE, CARBOXYPHOSPHONOENOLPYRUVATE/CN
E8            1     PHOSPHONOMUTASE, CARBOXYPHOSPHONOENOLPYRUVATE (PHYSCOMITRELL
                    A PATENS CLONE 88_MM13_G11REV FRAGMENT)/CN
E9            1     PHOSPHONOMUTASE, CARBOXYPHOSPHONOENOLPYRUVATE (STREPTOMYCES
                    HYGROSCOPICUS CLONE PBS-BAM3 SUBUNIT REDUCED)/CN
E10           1     PHOSPHONOMUTASE, CARBOXYPHOSPHONOENOLPYRUVATE (STREPTOMYCES
                    HYGROSCOPICUS CLONE PMSB113 REDUCED)/CN
E11           1     PHOSPHONOMUTASE, CARBOXYPHOSPHONOENOLPYRUVATE (SULFOLOBUS SO
                    LFATARICUS GENE PRPB)/CN
E12           1     PHOSPHONOMYCIN/CN

=> s e3
L2            0 PHOSPHONOMETHYLIMINODIACETIC/CN

=> d l2
L2 HAS NO ANSWERS
L2             0 SEA FILE=REGISTRY PHOSPHONOMETHYLIMINODIACETIC/CN


=> e N-phosphonomethyliminodiacetic  acid/cn
E1            1     N-PHOSPHONOMETHYLGLYCINE SODIUM SALT/CN
E2            1     N-PHOSPHONOMETHYLGLYCINE TRISODIUM SALT/CN
E3            0 --> N-PHOSPHONOMETHYLIMINODIACETIC  ACID/CN
E4            1     N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE DISODIUM SALT/CN
E5            1     N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE MONOSODIUM SALT/
                    CN
E6            1     N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE TETRASODIUM SALT
                    /CN
E7            1     N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE TRISODIUM SALT/C
                    N
E8            1     N-PHOSPHOPYRIDOXYL-.GAMMA.-AMINOBUTYRIC ACID/CN
E9            1     N-PHOSPHOPYRIDOXYL-GLYCINE/CN
E10           1     N-PHOSPHOPYRIDOXYL-L-ALANINE/CN
E11           1     N-PHOSPHORANYLIDENESILYLAMINE/CN
E12           1     N-PHOSPHORIBOSYLANTHRANILATE ISOMERASE-INDOLEGLYCEROL PHOSPH
                    ATE SYNTHETASE (BUCHNERA APHIDICOLA CLONE PBS2T-1 GENE TRPC(
                    F))/CN

=> s e3
L3            0 "N-PHOSPHONOMETHYLIMINODIACETIC  ACID"/CN

=>
=> e acetodisphonic acid/cn
E1            1     ACETOCYANOHYDRIN/CN
E2            1     ACETODIPHOSPHONIC ACID/CN
E3            0 --> ACETODISPHONIC ACID/CN
E4            1     ACETOEVERNONE/CN
E5            1     ACETOFENATE/CN
E6            1     ACETOFERROCENE/CN
E7            1     ACETOFLOCINIPIPERIDOL/CN
E8            1     ACETOFORMIC ANHYDRIDE/CN
E9            1     ACETOFURAN/CN
E10           1     ACETOGENIN G/CN
E11           1     ACETOGLYCERIDE/CN
E12           1     ACETOGLYCERIDE LC/CN

=> e methylamino dimethylene phosphonic acid/cn
E1            1     METHYLAMINO/CN
E2            1     METHYLAMINO ABAMECTIN BENZOATE/CN
```

```
E3            0 --> METHYLAMINO DIMETHYLENE PHOSPHONIC ACID/CN
E4            1     METHYLAMINO-N,N-BIS(2-METHYLENE-4,6-DIMETHYLPHENOL)/CN
E5            1     METHYLAMINO-N,N-BIS(2-METHYLENE-4,6-DIMETHYLPHENOL)N-OXIDE/C
                    N
E6            1     METHYLAMINO-O-ETHYL-O-(3,4,5-TRICHLOROPHENYL)THIONOPHOSPHONA
                    TE/CN
E7            1     METHYLAMINOACETALDEHYDE DIETHYL ACETAL/CN
E8            1     METHYLAMINOACETAMIDE/CN
E9            1     METHYLAMINOACETONE ETHYLENE KETAL/CN
E10           1     METHYLAMINOACETONITRILE BISULFATE/CN
E11           1     METHYLAMINOANTIPYRINE/CN
E12           1     METHYLAMINOANTIPYRINE N-DEMETHYLASE/CN

=> s PHOSPHONOMETHYLIMINOACETIC ACID/CN
L4            1 PHOSPHONOMETHYLIMINOACETIC ACID/CN

=> d 14

L4   ANSWER 1 OF 1  REGISTRY  COPYRIGHT 2003 ACS
RN   1071-83-6  REGISTRY
CN   Glycine, N-(phosphonomethyl)- (7CI, 8CI, 9CI)  (CA INDEX NAME)
OTHER NAMES:
CN   (Carboxymethylamino)methylphosphonic acid
CN   Accord
CN   Carboxymethylaminomethanephosphinic acid
CN   Folusen
CN   Forsat
CN   Glialka
CN   Glialka 36
CN   Glyphodin A
CN   Glyphomax
CN   Glyphosate
CN   Glyphosate CT
CN   Herbatop
CN   Hockey
CN   Kickdown
CN   Lancer
CN   MON 2139
CN   MON 6000
CN   N-Phosphomethylglycine
CN   N-Phosphonomethylglycine
CN   Phorsat
CN   Phosphonomethylglycine
CN   Phosphonomethyliminoacetic acid
CN   Rebel Garden
FS   3D CONCORD
DR   37337-60-3, 75241-08-6, 42618-09-7
MF   C3 H8 N O5 P
CI   COM
LC   STN Files:   AGRICOLA, ANABSTR, AQUIRE, BEILSTEIN*, BIOBUSINESS, BIOSIS,
       BIOTECHNO, CA, CABA, CANCERLIT, CAOLD, CAPLUS, CASREACT, CBNB, CEN,
       CHEMCATS, CHEMINFORMRX, CHEMLIST, CIN, CSCHEM, CSNB, DDFU, DRUGU,
       EMBASE, GMELIN*, HSDB*, IFICDB, IFIPAT, IFIUDB, IPA, MEDLINE, MRCK*,
       MSDS-OHS, NIOSHTIC, PIRA, PROMT, RTECS*, SPECINFO, TOXCENTER, ULIDAT,
       USPAT2, USPATFULL
         (*File contains numerically searchable property data)
     Other Sources:   DSL**, EINECS**
         (**Enter CHEMLIST File for up-to-date regulatory information)
```



```
**PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT**

            4396 REFERENCES IN FILE CA (1957 TO DATE)
             257 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
            4403 REFERENCES IN FILE CAPLUS (1957 TO DATE)
               2 REFERENCES IN FILE CAOLD (PRIOR TO 1967)


=> e  N-phosphonomethyliminodiacetic acid/cn
E1            1     N-PHOSPHONOMETHYLGLYCINE SODIUM SALT/CN
E2            1     N-PHOSPHONOMETHYLGLYCINE TRISODIUM SALT/CN
E3            0 --> N-PHOSPHONOMETHYLIMINODIACETIC ACID/CN
E4            1     N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE DISODIUM SALT/CN
E5            1     N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE MONOSODIUM SALT/
                    CN
E6            1     N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE TETRASODIUM SALT
                    /CN
E7            1     N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE TRISODIUM SALT/C
                    N
E8            1     N-PHOSPHOPYRIDOXYL-.GAMMA.-AMINOBUTYRIC ACID/CN
E9            1     N-PHOSPHOPYRIDOXYL-GLYCINE/CN
E10           1     N-PHOSPHOPYRIDOXYL-L-ALANINE/CN
E11           1     N-PHOSPHORANYLIDENESILYLAMINE/CN
E12           1     N-PHOSPHORIBOSYLANTHRANILATE ISOMERASE-INDOLEGLYCEROL PHOSPH
                    ATE SYNTHETASE (BUCHNERA APHIDICOLA CLONE PBS2T-1 GENE TRPC(
                    F))/CN

=> file registry
COST IN U.S. DOLLARS                            SINCE FILE      TOTAL
                                                   ENTRY    SESSION
FULL ESTIMATED COST                                38.56      38.77

FILE 'REGISTRY' ENTERED AT 12:32:32 ON 12 MAY 2003
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STRUCTURE FILE UPDATES:   11 MAY 2003  HIGHEST RN 514167-89-6
DICTIONARY FILE UPDATES:  11 MAY 2003  HIGHEST RN 514167-89-6

TSCA INFORMATION NOW CURRENT THROUGH JANUARY 6, 2003

  Please note that search-term pricing does apply when
  conducting SmartSELECT searches.

Crossover limits have been increased.  See HELP CROSSOVER for details.

Experimental and calculated property data are now available.  See HELP
PROPERTIES for more information.  See STNote 27, Searching Properties
in the CAS Registry File, for complete details:
http://www.cas.org/ONLINE/STN/STNOTES/stnotes27.pdf

=> e  N-phosphonomethyliminodiacetic acid/cn
E1            1     N-PHOSPHONOMETHYLGLYCINE SODIUM SALT/CN
E2            1     N-PHOSPHONOMETHYLGLYCINE TRISODIUM SALT/CN
E3            0 --> N-PHOSPHONOMETHYLIMINODIACETIC ACID/CN
E4            1     N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE DISODIUM SALT/CN
E5            1     N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE MONOSODIUM SALT/
```

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                  CN
E6          1     N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE TETRASODIUM SALT
                  /CN
E7          1     N-PHOSPHONOMETHYLIMINODIACETIC ACID N-OXIDE TRISODIUM SALT/C
                  N
E8          1     N-PHOSPHOPYRIDOXYL-.GAMMA.-AMINOBUTYRIC ACID/CN
E9          1     N-PHOSPHOPYRIDOXYL-GLYCINE/CN
E10         1     N-PHOSPHOPYRIDOXYL-L-ALANINE/CN
E11         1     N-PHOSPHORANYLIDENESILYLAMINE/CN
E12         1     N-PHOSPHORIBOSYLANTHRANILATE ISOMERASE-INDOLEGLYCEROL PHOSPH
                  ATE SYNTHETASE (BUCHNERA APHIDICOLA CLONE PBS2T-1 GENE TRPC(
                  F))/CN

=> s  N-phosphonomethyliminodiacetic acid
       4653138 N
             5 PHOSPHONOMETHYLIMINODIACETIC
       5887866 ACID
L5           4 N-PHOSPHONOMETHYLIMINODIACETIC ACID
                 (N(W)PHOSPHONOMETHYLIMINODIACETIC(W)ACID)

=> d l5, all

L5   ANSWER 1 OF 4  REGISTRY  COPYRIGHT 2003 ACS
RN   90041-38-6  REGISTRY
CN   Glycine, N-(carboxymethyl)-N-(phosphonomethyl)-, N-oxide, sodium salt
     (9CI)  (CA INDEX NAME)
OTHER NAMES:
CN   N-Phosphonomethyliminodiacetic acid N-oxide monosodium salt
MF   C5 H10 N O8 P . x Na
LC   STN Files:   CA, CAPLUS, USPATFULL
CRN  (53792-63-5)
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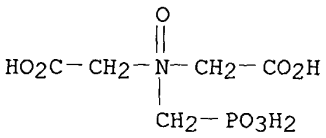

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             1 REFERENCES IN FILE CA (1957 TO DATE)
             1 REFERENCES IN FILE CAPLUS (1957 TO DATE)

REFERENCE  1

AN   100:187352  CA
TI   N-Organophosphonomethylglycine N-oxides and their use to increase the
     sucrose content of sugarcane
IN   Franz, John E.
PA   Monsanto Co. , USA
SO   U.S., 4 pp. Cont.-in-part of U.S. Ser. No. 6133,707, abandoned.
     CODEN: USXXAM
DT   Patent
LA   English
IC   A01N057-00
NCL  071086000
CC   5-3 (Agrochemical Bioregulators)
FAN.CNT 4
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	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 4435204	A	19840306	US 1980-133379	19800324
	AT 792975	A	19780215	AT 1975-7929	19731210
	AT 345864	B	19780815		
	AT 343135	B	19780510	AT 1975-7931	19751017
	DK 7600538	A	19760210	DK 1976-538	19760210
	DK 142162	B	19800915		
	DK 142162	C	19810216		
	DK 7600537	A	19760210	DK 1976-537	19760210
	DK 141951	B	19800728		
	DK 141951	C	19801215		
PRAI	US 1972-313706	19721211			
	US 1975-613707	19750915			
	AT 1973-10302	19731210			
	DK 1973-6678	19731210			

AB Phosphonomethylglycine N-oxides, prepd. as described in US 4,062,669, increased sucrose [57-50-1] content of sugarcane when applied 2-10 wk prior to harvest, at .apprx.0.112-5.6 kg/ha. Examples are: N-phosphonomethyliminodiacetic acid N-oxide [53792-63-5], N-methyl-N-phosphonomethylglycine N-oxide [53792-84-0], and Et N,N-bis(phosphonomethyl)glycine N-oxide [69595-84-2]. These compds. increased juice purity percentage and sucrose content (Pol percent cane).

ST phosphonomethylglycine oxide sugarcane sucrose

IT Sugarcane
(sucrose of, organophosphonomethylglycine oxides increase of)

IT 57-50-1, biological studies
RL: BIOL (Biological study)
(of sugarcane, organophosphonomethylglycine oxides increase of)

IT 24569-83-3 53792-63-5 53792-64-6 53792-65-7 53792-66-8
53792-67-9 53792-68-0 53792-69-1 53792-70-4 53792-71-5
53792-73-7 53792-75-9 53792-76-0 53792-79-3 53792-80-6
53792-82-8 53792-84-0 53792-86-2 69595-83-1 69595-84-2
69595-86-4 69595-87-5 90041-38-6 90041-39-7 90041-40-0
90041-41-1
RL: BIOL (Biological study)
(sucrose content increase by, in sugarcane)

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=> d 2-4 kwic

L5   ANSWER 2 OF 4  REGISTRY  COPYRIGHT 2003 ACS
OTHER NAMES:
CN   N-Phosphonomethyliminodiacetic acid N-oxide tetrasodium salt

L5   ANSWER 3 OF 4  REGISTRY  COPYRIGHT 2003 ACS
OTHER NAMES:
CN   N-Phosphonomethyliminodiacetic acid N-oxide trisodium salt

L5   ANSWER 4 OF 4  REGISTRY  COPYRIGHT 2003 ACS
OTHER NAMES:
CN   N-Phosphonomethyliminodiacetic acid N-oxide disodium salt


=> d his

     (FILE 'HOME' ENTERED AT 12:01:33 ON 12 MAY 2003)

     FILE 'REGISTRY' ENTERED AT 12:02:16 ON 12 MAY 2003
                E PHOSPHONOMETHYLIMINODIACETIC  ACID/CN
L1            0 S E3
                E N-PHOSPHONOMETHYLIMINODIACETIC  ACID/CN
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                E N-PHOSPHONOMETHYLIMINODIACETIC/CN
                E PHOSPHONOMETHYLIMINODIACETIC/CN
L2            0 S E3
                E N-PHOSPHONOMETHYLIMINODIACETIC  ACID/CN
L3            0 S E3
                E ACETODISPHONIC ACID/CN
                E METHYLAMINO DIMETHYLENE PHOSPHONIC ACID/CN
L4            1 S PHOSPHONOMETHYLIMINOACETIC ACID/CN
                E  N-PHOSPHONOMETHYLIMINODIACETIC ACID/CN

     FILE 'REGISTRY' ENTERED AT 12:32:32 ON 12 MAY 2003
                E  N-PHOSPHONOMETHYLIMINODIACETIC ACID/CN
L5            4 S  N-PHOSPHONOMETHYLIMINODIACETIC ACID

=> d l5, 1-4, all

L5   ANSWER 1 OF 4  REGISTRY  COPYRIGHT 2003 ACS
RN   90041-38-6  REGISTRY
CN   Glycine, N-(carboxymethyl)-N-(phosphonomethyl)-, N-oxide, sodium salt
     (9CI)  (CA INDEX NAME)
OTHER NAMES:
CN   N-Phosphonomethyliminodiacetic acid N-oxide monosodium salt
MF   C5 H10 N O8 P . x Na
LC   STN Files:   CA, CAPLUS, USPATFULL
CRN  (53792-63-5)
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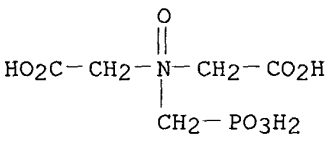

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              1 REFERENCES IN FILE CA (1957 TO DATE)
              1 REFERENCES IN FILE CAPLUS (1957 TO DATE)

REFERENCE  1

AN   100:187352  CA
TI   N-Organophosphonomethylglycine N-oxides and their use to increase the
     sucrose content of sugarcane
IN   Franz, John E.
PA   Monsanto Co. , USA
SO   U.S., 4 pp. Cont.-in-part of U.S. Ser. No. 6133,707, abandoned.
     CODEN: USXXAM
DT   Patent
LA   English
IC   A01N057-00
NCL  071086000
CC   5-3 (Agrochemical Bioregulators)
FAN.CNT 4
     PATENT NO.        KIND  DATE          APPLICATION NO.   DATE
     ---------------   ----  --------      ---------------   --------
PI   US 4435204         A    19840306      US 1980-133379    19800324
     AT 792975          A    19780215      AT 1975-7929      19731210
     AT 345864          B    19780815
     AT 343135          B    19780510      AT 1975-7931      19751017
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	DK 7600538	A	19760210	DK 1976-538	19760210
	DK 142162	B	19800915		
	DK 142162	C	19810216		
	DK 7600537	A	19760210	DK 1976-537	19760210
	DK 141951	B	19800728		
	DK 141951	C	19801215		

PRAI US 1972-313706 19721211
US 1975-613707 19750915
AT 1973-10302 19731210
DK 1973-6678 19731210

AB Phosphonomethylglycine N-oxides, prepd. as described in US 4,062,669, increased sucrose [57-50-1] content of sugarcane when applied 2-10 wk prior to harvest, at .apprx.0.112-5.6 kg/ha. Examples are: N-phosphonomethyliminodiacetic acid N-oxide [53792-63-5], N-methyl-N-phosphonomethylglycine N-oxide [53792-84-0], and Et N,N-bis(phosphonomethyl)glycine N-oxide [69595-84-2]. These compds. increased juice purity percentage and sucrose content (Pol percent cane).

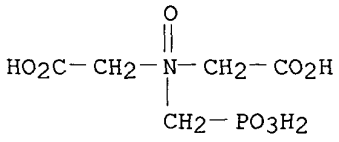
ST phosphonomethylglycine oxide sugarcane sucrose

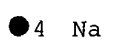
IT Sugarcane
(sucrose of, organophosphonomethylglycine oxides increase of)

IT 57-50-1, biological studies
RL: BIOL (Biological study)
(of sugarcane, organophosphonomethylglycine oxides increase of)

IT 24569-83-3 53792-63-5 53792-64-6 53792-65-7 53792-66-8
53792-67-9 53792-68-0 53792-69-1 53792-70-4 53792-71-5
53792-73-7 53792-75-9 53792-76-0 53792-79-3 53792-80-6
53792-82-8 53792-84-0 53792-86-2 69595-83-1 69595-84-2
69595-86-4 69595-87-5 90041-38-6 90041-39-7 90041-40-0
90041-41-1
RL: BIOL (Biological study)
(sucrose content increase by, in sugarcane)

L5 ANSWER 2 OF 4 REGISTRY COPYRIGHT 2003 ACS
RN 53792-86-2 REGISTRY
CN Glycine, N-(carboxymethyl)-N-(phosphonomethyl)-, N-oxide, tetrasodium salt (9CI) (CA INDEX NAME)
OTHER NAMES:
CN **N-Phosphonomethyliminodiacetic acid N-oxide tetrasodium salt**
MF C5 H10 N O8 P . 4 Na
LC STN Files: CA, CAPLUS, IFICDB, IFIPAT, IFIUDB, TOXCENTER, USPATFULL
CRN (53792-63-5)





4 REFERENCES IN FILE CA (1957 TO DATE)
4 REFERENCES IN FILE CAPLUS (1957 TO DATE)

REFERENCE 1

AN 100:187352 CA
TI N-Organophosphonomethylglycine N-oxides and their use to increase the sucrose content of sugarcane

IN Franz, John E.
PA Monsanto Co. , USA
SO U.S., 4 pp. Cont.-in-part of U.S. Ser. No. 6133,707, abandoned.
CODEN: USXXAM
DT Patent
LA English
IC A01N057-00
NCL 071086000
CC 5-3 (Agrochemical Bioregulators)
FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 4435204	A	19840306	US 1980-133379	19800324
	AT 792975	A	19780215	AT 1975-7929	19731210
	AT 345864	B	19780815		
	AT 343135	B	19780510	AT 1975-7931	19751017
	DK 7600538	A	19760210	DK 1976-538	19760210
	DK 142162	B	19800915		
	DK 142162	C	19810216		
	DK 7600537	A	19760210	DK 1976-537	19760210
	DK 141951	B	19800728		
	DK 141951	C	19801215		
PRAI	US 1972-313706	19721211			
	US 1975-613707	19750915			
	AT 1973-10302	19731210			
	DK 1973-6678	19731210			

AB Phosphonomethylglycine N-oxides, prepd. as described in US 4,062,669, increased sucrose [57-50-1] content of sugarcane when applied 2-10 wk prior to harvest, at .apprx.0.112-5.6 kg/ha. Examples are: N-phosphonomethyliminodiacetic acid N-oxide [53792-63-5], N-methyl-N-phosphonomethylglycine N-oxide [53792-84-0], and Et N,N-bis(phosphonomethyl)glycine N-oxide [69595-84-2]. These compds. increased juice purity percentage and sucrose content (Pol percent cane).
ST phosphonomethylglycine oxide sugarcane sucrose
IT Sugarcane
(sucrose of, organophosphonomethylglycine oxides increase of)
IT 57-50-1, biological studies
RL: BIOL (Biological study)
(of sugarcane, organophosphonomethylglycine oxides increase of)
IT 24569-83-3 53792-63-5 53792-64-6 53792-65-7 53792-66-8
53792-67-9 53792-68-0 53792-69-1 53792-70-4 53792-71-5
53792-73-7 53792-75-9 53792-76-0 53792-79-3 53792-80-6
53792-82-8 53792-84-0 53792-86-2 69595-83-1 69595-84-2
69595-86-4 69595-87-5 90041-38-6 90041-39-7 90041-40-0
90041-41-1
RL: BIOL (Biological study)
(sucrose content increase by, in sugarcane)

REFERENCE 2

AN 90:138024 CA
TI N-Organo-N-phosphonomethylglycine N-oxides and phytotoxicant compositions containing them
IN Franz, John E.
PA Monsanto Co., USA
SO U.S., 11 pp. Cont.-in-part of U.S. 4,062,669.
CODEN: USXXAM
DT Patent
LA English
IC A01N009-36
NCL 071086000
CC 29-7 (Organometallic and Organometalloidal Compounds)

Section cross-reference(s): 5

FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 4130412	A	19781219	US 1977-836187	19770926
	AT 792975	A	19780215	AT 1975-7929	19731210
	AT 345864	B	19780815		
	US 4062669	A	19771213	US 1975-613708	19750915
	AT 343135	B	19780510	AT 1975-7931	19751017
	DK 7600538	A	19760210	DK 1976-538	19760210
	DK 142162	B	19800915		
	DK 142162	C	19810216		
	DK 7600537	A	19760210	DK 1976-537	19760210
	DK 141951	B	19800728		
	DK 141951	C	19801215		
PRAI	US 1972-313706	19721211			
	US 1975-613708	19750909			
	AT 1973-10302	19731210			
	DK 1973-6678	19731210			

AB The title compds. RO2CCH2N(O)R3CH2P(O)(OR1)(OR2) [I, R1, R2 = H, metal cation, ammonium; R, R1 = alkyl; R3 = CnH2nCO2R, n = 1-10] were prepd. by oxidn. of RO2CCH2NR3CH2P(O)(OR1)(OR2) with per acids. Thus, 0.06 mol [HO2CCH2]2NCH2P(O)(OH)2, 100 mL. HOAc, and 0.6 g H2SO4 was treated with 0.21 mol H2O2 at 75-80.degree. to give 9.2 g [HO2CCH2]2N(O)CH2P(O)(OH)2 (II). At 4 lb/acre II gave 100% kill of Canada Thistle, Lambsquarters, Nutsedge, and Quackgrass.

ST herbicide phosphonomethylglycine oxide; phytotoxicant phosphonomethylglycine oxide; oxidn phosphonomethylglycine; glycine phosphonomethyl oxide

IT Herbicides
(phosphonomethylglycine oxides)

IT 53792-64-6 53792-66-8 53792-78-2 53792-79-3 53792-80-6
53792-81-7 53792-82-8 53792-83-9
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); BIOL (Biological study)
(herbicidal activity of)

IT 2439-99-8 5994-61-6 24569-83-3 53792-88-4 53792-89-5 69595-88-6
RL: RCT (Reactant); RACT (Reactant or reagent)
(oxidn. of)

IT 53792-63-5P 53792-67-9P 53792-68-0P 53792-69-1P 53792-70-4P
53792-71-5P 53792-72-6P 53792-74-8P 53792-75-9P 53792-76-0P
53792-84-0P 53792-86-2P 69595-82-0P 69595-83-1P 69595-84-2P
69595-85-3P 69595-86-4P 69595-87-5P
RL: AGR (Agricultural use); BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); SPN (Synthetic preparation); BIOL (Biological study); PREP (Preparation); USES (Uses)
(prepn. and herbicidal activity of)

IT 53792-65-7P 53792-73-7P
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. of)

REFERENCE 3

AN 90:138021 CA

TI N-Organo-N-phosphonomethylglycine-N-oxides and phytotoxicant compositions containing them

IN Franz, John E.
PA Monsanto Co., USA

SO U.S., 11 pp. Cont.-in-part of U.S. 4,062,669.
CODEN: USXXAM

DT Patent

LA English

IC A01N009-36
NCL 071086000
CC 29-7 (Organometallic and Organometalloidal Compounds)
Section cross-reference(s): 5
FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 4131448	A	19781226	US 1977-836338	19770926
	AT 792975	A	19780215	AT 1975-7929	19731210
	AT 345864	B	19780815		
	US 4062669	A	19771213	US 1975-613708	19750915
	AT 343135	B	19780510	AT 1975-7931	19751017
	DK 7600538	A	19760210	DK 1976-538	19760210
	DK 142162	B	19800915		
	DK 142162	C	19810216		
	DK 7600537	A	19760210	DK 1976-537	19760210
	DK 141951	B	19800728		
	DK 141951	C	19801215		
PRAI	US 1972-313706	19721211			
	US 1975-613708	19750909			
	AT 1973-10302	19731210			
	DK 1973-6678	19731210			

AB The title compds., RO2CCH2N(O)R3CH2P(O)(OR1)(OR2) [I, R1, R2 = H, metal cation, ammonium; R = R1, lower alkyl; R3 = C1-12 alkyl, allyl, cyclohexyl, phenalkyl, phenoxyalkyl] were prepd. by oxidn. of RO2CCH2NR3CH2P(O)(OR1)(OR2) with a peroxide. Thus, 0.06 mol (HO2CCH2)2NCH2P(O)(OH)2, 100 mL HOAc, and 0.6 g H2SO4 was treated with 0.21 mol 30% H2O2 over 25 min to give 9.2 g (HO2CCH2)2N(O)CH2P(O)(OH)2 (II). At 4 lb/acre II killed Canada Thistle, Lambsquarters, Nutsedge, and Quackgrass.

ST herbicide phosphonomethylglycine oxide; phytotoxicant phosphonomethylglycine oxide; glycine oxide phosphonomethyl; oxidn phosphonomethylglycine

IT Herbicides
(phosphonomethylglycine oxides)

IT 53792-64-6 53792-66-8 53792-78-2 53792-79-3 53792-80-6
53792-81-7 53792-82-8 53792-83-9 53792-86-2
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); BIOL (Biological study)
(herbicidal activity of)

IT 2439-99-8 5994-61-6 24569-83-3 53792-88-4 53792-89-5 69595-88-6
RL: RCT (Reactant); RACT (Reactant or reagent)
(oxidn. of)

IT 53792-63-5P 53792-67-9P 53792-68-0P 53792-69-1P 53792-70-4P
53792-71-5P 53792-72-6P 53792-73-7P 53792-74-8P 53792-75-9P
53792-76-0P 53792-84-0P 53792-87-3P 69595-82-0P 69595-83-1P
69595-84-2P 69595-85-3P 69595-86-4P 69595-87-5P 69595-89-7P
69595-90-0P 69595-91-1P
RL: AGR (Agricultural use); BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); SPN (Synthetic preparation); BIOL (Biological study); PREP (Preparation); USES (Uses)
(prepn. and herbicidal activity of)

IT 53792-65-7P
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. of)

REFERENCE 4

AN 82:39571 CA
TI N-Organo-N-phosphonomethylglycine N-oxides and their use in plant growth regulating and phytotoxic preparations
IN Franz, John E.

PA Monsanto Co.
SO Ger. Offen., 68 pp.
CODEN: GWXXBX
DT Patent
LA German
IC C07F; A01N
CC 5-3 (Agrochemicals)
Section cross-reference(s): 29
FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 2361382	A1	19740612	DE 1973-2361382	19731210
	DE 2361382	B2	19800508		
	DE 2361382	C3	19810212		
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	RO 67869	P	19810622	RO 1973-76882	19731204
	NL 7316784	A	19740613	NL 1973-16784	19731207
	NL 173408	B	19830816		
	NL 173408	C	19840116		
	ES 421263	A1	19760616	ES 1973-421263	19731207
	BE 808448	A1	19740610	BE 1973-138707	19731210
	FR 2209770	A1	19740705	FR 1973-43994	19731210
	FR 2209770	B1	19781110		
	JP 49086549	A2	19740819	JP 1973-136936	19731210
	JP 52041336	B4	19771018		
	ZA 7309372	A	19741127	ZA 1973-9372	19731210
	DD 112598	C	19750420	DD 1973-20175229	19731210
	AU 7363435	A1	19750612	AU 1973-63435	19731210
	AT 7310302	A	19760415	AT 1973-10302	19731210
	AT 334129	B	19761227		
	CH 577784	A	19760730	CH 1973-17275	19731210
	GB 1449875	A	19760915	GB 1973-57150	19731210
	PL 91572	P	19770331	PL 1973-167194	19731210
	PL 94192	P	19770730	PL 1973-183652	19731210
	CS 179995	P	19771230	CS 1973-8527	19731210
	IL 43790	A1	19771230	IL 1973-43790	19731210
	AT 792975	A	19780215	AT 1975-7929	19731210
	AT 345864	B	19780815		
	CA 1032174	A1	19780530	CA 1973-187756	19731210
	SE 407804	B	19790423	SE 1973-16612	19731210
	SE 407804	C	19790802		
	HU 173367	P	19790428	HU 1973-MO890	19731210
	DK 142056	B	19800818	DK 1973-6678	19731210
	DK 142056	C	19810112		
	SU 850008	A3	19810723	SU 1973-1976101	19731210
	SU 651648	D	19790305	SU 1974-2043771	19740715
	AT 343135	B	19780510	AT 1975-7931	19751017
	DK 7600538	A	19760210	DK 1976-538	19760210
	DK 142162	B	19800915		
	DK 142162	C	19810216		
	DK 7600537	A	19760210	DK 1976-537	19760210
	DK 141951	B	19800728		
	DK 141951	C	19801215		
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	SE 7800073	A	19790704	SE 1978-73	19780103
	SE 436089	B	19841112		
	SE 436089	C	19850221		

PRAI US 1972-313706 19721211
AT 1973-10302 19731210
DK 1973-6678 19731210
AB R1O2CCH2N(O)RCH2P(O)(OR2)(OR3) [I,R = CH2CO2R1, CH2P(O)(OR2)(OR3), or C1-12 alkyl; R1 = H, lower alkyl, or metal; R2 and R3 = H, metal, NH4 or

amine] are plant growth regulators and herbicides. Thus, N-phosphonomethyliminodiacetic acid N-oxide (R = ,CH2CO2H, R1 = R2 = R3 = H) [53792-63-5] at 4.5 kg/ha controlled nutsedge in greenhouse.

ST phosphonomethylglycine oxide herbicide; glycine oxide herbicide

IT Plant hormones and regulators
RL: BIOL (Biological study)
(phosphonomethylglycine oxide)

IT Herbicides
(phosphonomethylglycine oxides)

IT 2439-99-8 5994-61-6 24569-83-3 53792-88-4 53792-89-5
RL: RCT (Reactant); RACT (Reactant or reagent)
(oxidn. of)

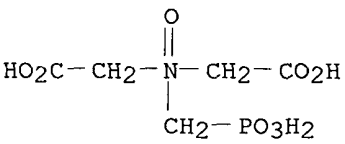
IT 53792-77-1 53792-78-2 53792-79-3 53792-80-6 53792-81-7
53792-82-8 53792-83-9 53792-84-0 53792-85-1 53792-87-3
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); BIOL (Biological study)
(plant growth regulator activity of)

IT 53792-86-2P
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. and plant growth regulator activity of)

IT 53792-68-0P 53792-69-1P 53792-70-4P 53792-71-5P 53792-72-6P
53792-73-7P 53792-74-8P 53792-75-9P 53792-76-0P
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. and plant-growth regulating activity of)

IT 53792-63-5P 53792-64-6P 53792-65-7P 53792-66-8P 53792-67-9P
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. and plant-growth regulator activity of)

L5 ANSWER 3 OF 4 REGISTRY COPYRIGHT 2003 ACS
RN 53792-80-6 REGISTRY
CN Glycine, N-(carboxymethyl)-N-(phosphonomethyl)-, N-oxide, trisodium salt (9CI) (CA INDEX NAME)
OTHER NAMES:
CN **N-Phosphonomethyliminodiacetic acid N-oxide trisodium salt**
MF C5 H10 N O8 P . 3 Na
LC STN Files: CA, CAPLUS, IFICDB, IFIPAT, IFIUDB, TOXCENTER, USPATFULL
CRN (53792-63-5)



●3 Na

4 REFERENCES IN FILE CA (1957 TO DATE)
4 REFERENCES IN FILE CAPLUS (1957 TO DATE)

REFERENCE 1

AN 100:187352 CA
TI N-Organophosphonomethylglycine N-oxides and their use to increase the sucrose content of sugarcane
IN Franz, John E.
PA Monsanto Co. , USA
SO U.S., 4 pp. Cont.-in-part of U.S. Ser. No. 6133,707, abandoned.
CODEN: USXXAM

DT Patent
LA English
IC A01N057-00
NCL 071086000
CC 5-3 (Agrochemical Bioregulators)
FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 4435204	A	19840306	US 1980-133379	19800324
	AT 792975	A	19780215	AT 1975-7929	19731210
	AT 345864	B	19780815		
	AT 343135	B	19780510	AT 1975-7931	19751017
	DK 7600538	A	19760210	DK 1976-538	19760210
	DK 142162	B	19800915		
	DK 142162	C	19810216		
	DK 7600537	A	19760210	DK 1976-537	19760210
	DK 141951	B	19800728		
	DK 141951	C	19801215		
PRAI	US 1972-313706	19721211			
	US 1975-613707	19750915			
	AT 1973-10302	19731210			
	DK 1973-6678	19731210			

AB Phosphonomethylglycine N-oxides, prepd. as described in US 4,062,669, increased sucrose [57-50-1] content of sugarcane when applied 2-10 wk prior to harvest, at .apprx.0.112-5.6 kg/ha. Examples are: N-phosphonomethyliminodiacetic acid N-oxide [53792-63-5], N-methyl-N-phosphonomethylglycine N-oxide [53792-84-0], and Et N,N-bis(phosphonomethyl)glycine N-oxide [69595-84-2]. These compds. increased juice purity percentage and sucrose content (Pol percent cane).
ST phosphonomethylglycine oxide sugarcane sucrose
IT Sugarcane
(sucrose of, organophosphonomethylglycine oxides increase of)
IT 57-50-1, biological studies
RL: BIOL (Biological study)
(of sugarcane, organophosphonomethylglycine oxides increase of)
IT 24569-83-3 53792-63-5 53792-64-6 53792-65-7 53792-66-8
53792-67-9 53792-68-0 53792-69-1 53792-70-4 53792-71-5
53792-73-7 53792-75-9 53792-76-0 53792-79-3 53792-80-6
53792-82-8 53792-84-0 53792-86-2 69595-83-1 69595-84-2
69595-86-4 69595-87-5 90041-38-6 90041-39-7 90041-40-0
90041-41-1
RL: BIOL (Biological study)
(sucrose content increase by, in sugarcane)

REFERENCE 2

AN 90:138024 CA
TI N-Organo-N-phosphonomethylglycine N-oxides and phytotoxicant compositions containing them
IN Franz, John E.
PA Monsanto Co., USA
SO U.S., 11 pp. Cont.-in-part of U.S. 4,062,669.
CODEN: USXXAM
DT Patent
LA English
IC A01N009-36
NCL 071086000
CC 29-7 (Organometallic and Organometalloidal Compounds)
Section cross-reference(s): 5
FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE

PI	US 4130412	A	19781219	US 1977-836187	19770926
	AT 792975	A	19780215	AT 1975-7929	19731210
	AT 345864	B	19780815		
	US 4062669	A	19771213	US 1975-613708	19750915
	AT 343135	B	19780510	AT 1975-7931	19751017
	DK 7600538	A	19760210	DK 1976-538	19760210
	DK 142162	B	19800915		
	DK 142162	C	19810216		
	DK 7600537	A	19760210	DK 1976-537	19760210
	DK 141951	B	19800728		
	DK 141951	C	19801215		
PRAI	US 1972-313706	19721211			
	US 1975-613708	19750909			
	AT 1973-10302	19731210			
	DK 1973-6678	19731210			

AB The title compds. RO2CCH2N(O)R3CH2P(O)(OR1)(OR2) [I, R1, R2 = H, metal cation, ammonium; R, R1 = alkyl; R3 = CnH2nCO2R, n = 1-10] were prepd. by oxidn. of RO2CCH2NR3CH2P(O)(OR1)(OR2) with per acids. Thus, 0.06 mol [HO2CCH2]2NCH2P(O)(OH)2, 100 mL. HOAc, and 0.6 g H2SO4 was treated with 0.21 mol H2O2 at 75-80.degree. to give 9.2 g [HO2CCH2]2N(O)CH2P(O)(OH)2 (II). At 4 lb/acre II gave 100% kill of Canada Thistle, Lambsquarters, Nutsedge, and Quackgrass.

ST herbicide phosphonomethylglycine oxide; phytotoxicant phosphonomethylglycine oxide; oxidn phosphonomethylglycine; glycine phosphonomethyl oxide

IT Herbicides
(phosphonomethylglycine oxides)

IT 53792-64-6 53792-66-8 53792-78-2 53792-79-3 53792-80-6
53792-81-7 53792-82-8 53792-83-9
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); BIOL (Biological study)
(herbicidal activity of)

IT 2439-99-8 5994-61-6 24569-83-3 53792-88-4 53792-89-5 69595-88-6
RL: RCT (Reactant); RACT (Reactant or reagent)
(oxidn. of)

IT 53792-63-5P 53792-67-9P 53792-68-0P 53792-69-1P 53792-70-4P
53792-71-5P 53792-72-6P 53792-74-8P 53792-75-9P 53792-76-0P
53792-84-0P 53792-86-2P 69595-82-0P 69595-83-1P 69595-84-2P
69595-85-3P 69595-86-4P 69595-87-5P
RL: AGR (Agricultural use); BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); SPN (Synthetic preparation); BIOL (Biological study); PREP (Preparation); USES (Uses)
(prepn. and herbicidal activity of)

IT 53792-65-7P 53792-73-7P
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. of)

REFERENCE 3

AN 90:138021 CA

TI N-Organo-N-phosphonomethylglycine-N-oxides and phytotoxicant compositions containing them

IN Franz, John E.
PA Monsanto Co., USA

SO U.S., 11 pp. Cont.-in-part of U.S. 4,062,669.
CODEN: USXXAM
DT Patent
LA English
IC A01N009-36
NCL 071086000
CC 29-7 (Organometallic and Organometalloidal Compounds)
Section cross-reference(s): 5

FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 4131448	A	19781226	US 1977-836338	19770926
	AT 792975	A	19780215	AT 1975-7929	19731210
	AT 345864	B	19780815		
	US 4062669	A	19771213	US 1975-613708	19750915
	AT 343135	B	19780510	AT 1975-7931	19751017
	DK 7600538	A	19760210	DK 1976-538	19760210
	DK 142162	B	19800915		
	DK 142162	C	19810216		
	DK 7600537	A	19760210	DK 1976-537	19760210
	DK 141951	B	19800728		
	DK 141951	C	19801215		
PRAI	US 1972-313706	19721211			
	US 1975-613708	19750909			
	AT 1973-10302	19731210			
	DK 1973-6678	19731210			

AB The title compds., RO2CCH2N(O)R3CH2P(O)(OR1)(OR2) [I, R1, R2 = H, metal cation, ammonium; R = R1, lower alkyl; R3 = C1-12 alkyl, allyl, cyclohexyl, phenalkyl, phenoxyalkyl] were prepd. by oxidn. of RO2CCH2NR3CH2P(O)(OR1)(OR2) with a peroxide. Thus, 0.06 mol (HO2CCH2)2NCH2P(O)(OH)2, 100 mL HOAc, and 0.6 g H2SO4 was treated with 0.21 mol 30% H2O2 over 25 min to give 9.2 g (HO2CCH2)2N(O)CH2P(O)(OH)2 (II). At 4 lb/acre II killed Canada Thistle, Lambsquarters, Nutsedge, and Quackgrass.

ST herbicide phosphonomethylglycine oxide; phytotoxicant phosphonomethylglycine oxide; glycine oxide phosphonomethyl; oxidn phosphonomethylglycine

IT Herbicides
(phosphonomethylglycine oxides)

IT 53792-64-6 53792-66-8 53792-78-2 53792-79-3 53792-80-6
53792-81-7 53792-82-8 53792-83-9 53792-86-2
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); BIOL (Biological study)
(herbicidal activity of)

IT 2439-99-8 5994-61-6 24569-83-3 53792-88-4 53792-89-5 69595-88-6
RL: RCT (Reactant); RACT (Reactant or reagent)
(oxidn. of)

IT 53792-63-5P 53792-67-9P 53792-68-0P 53792-69-1P 53792-70-4P
53792-71-5P 53792-72-6P 53792-73-7P 53792-74-8P 53792-75-9P
53792-76-0P 53792-84-0P 53792-87-3P 69595-82-0P 69595-83-1P
69595-84-2P 69595-85-3P 69595-86-4P 69595-87-5P 69595-89-7P
69595-90-0P 69595-91-1P
RL: AGR (Agricultural use); BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); SPN (Synthetic preparation); BIOL (Biological study); PREP (Preparation); USES (Uses)
(prepn. and herbicidal activity of)

IT 53792-65-7P
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. of)

REFERENCE 4

AN 82:39571 CA

TI N-Organo-N-phosphonomethylglycine N-oxides and their use in plant growth regulating and phytotoxic preparations

IN Franz, John E.

PA Monsanto Co.

SO Ger. Offen., 68 pp.
CODEN: GWXXBX

DT Patent

LA German
IC C07F; A01N
CC 5-3 (Agrochemicals)
Section cross-reference(s): 29
FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 2361382	A1	19740612	DE 1973-2361382	19731210
	DE 2361382	B2	19800508		
	DE 2361382	C3	19810212		
	BR 7309524	A0	19740829	BR 1973-9524	19731204
	RO 67869	P	19810622	RO 1973-76882	19731204
	NL 7316784	A	19740613	NL 1973-16784	19731207
	NL 173408	B	19830816		
	NL 173408	C	19840116		
	ES 421263	A1	19760616	ES 1973-421263	19731207
	BE 808448	A1	19740610	BE 1973-138707	19731210
	FR 2209770	A1	19740705	FR 1973-43994	19731210
	FR 2209770	B1	19781110		
	JP 49086549	A2	19740819	JP 1973-136936	19731210
	JP 52041336	B4	19771018		
	ZA 7309372	A	19741127	ZA 1973-9372	19731210
	DD 112598	C	19750420	DD 1973-20175229	19731210
	AU 7363435	A1	19750612	AU 1973-63435	19731210
	AT 7310302	A	19760415	AT 1973-10302	19731210
	AT 334129	B	19761227		
	CH 577784	A	19760730	CH 1973-17275	19731210
	GB 1449875	A	19760915	GB 1973-57150	19731210
	PL 91572	P	19770331	PL 1973-167194	19731210
	PL 94192	P	19770730	PL 1973-183652	19731210
	CS 179995	P	19771230	CS 1973-8527	19731210
	IL 43790	A1	19771230	IL 1973-43790	19731210
	AT 792975	A	19780215	AT 1975-7929	19731210
	AT 345864	B	19780815		
	CA 1032174	A1	19780530	CA 1973-187756	19731210
	SE 407804	B	19790423	SE 1973-16612	19731210
	SE 407804	C	19790802		
	HU 173367	P	19790428	HU 1973-MO890	19731210
	DK 142056	B	19800818	DK 1973-6678	19731210
	DK 142056	C	19810112		
	SU 850008	A3	19810723	SU 1973-1976101	19731210
	SU 651648	D	19790305	SU 1974-2043771	19740715
	AT 343135	B	19780510	AT 1975-7931	19751017
	DK 7600538	A	19760210	DK 1976-538	19760210
	DK 142162	B	19800915		
	DK 142162	C	19810216		
	DK 7600537	A	19760210	DK 1976-537	19760210
	DK 141951	B	19800728		
	DK 141951	C	19801215		
	ES 458382	A1	19781001	ES 1977-458382	19770502
	SE 7800073	A	19790704	SE 1978-73	19780103
	SE 436089	B	19841112		
	SE 436089	C	19850221		

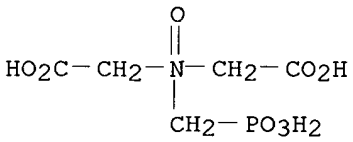
PRAI US 1972-313706 19721211
AT 1973-10302 19731210
DK 1973-6678 19731210

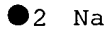
AB R1O2CCH2N(O)RCH2P(O)(OR2)(OR3) [I,R = CH2CO2R1, CH2P(O)(OR2)(OR3), or C1-12 alkyl; R1 = H, lower alkyl, or metal; R2 and R3 = H, metal, NH4 or amine] are plant growth regulators and herbicides. Thus, N-phosphonomethyliminodiacetic acid N-oxide (R = ,CH2CO2H, R1 = R2 = R3 = H) [53792-63-5] at 4.5 kg/ha controlled nutsedge in greenhouse.

ST phosphonomethylglycine oxide herbicide; glycine oxide herbicide

IT Plant hormones and regulators
RL: BIOL (Biological study)
(phosphonomethylglycine oxide)
IT Herbicides
(phosphonomethylglycine oxides)
IT 2439-99-8 5994-61-6 24569-83-3 53792-88-4 53792-89-5
RL: RCT (Reactant); RACT (Reactant or reagent)
(oxidn. of)
IT 53792-77-1 53792-78-2 53792-79-3 53792-80-6 53792-81-7
53792-82-8 53792-83-9 53792-84-0 53792-85-1 53792-87-3
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); BIOL (Biological study)
(plant growth regulator activity of)
IT 53792-86-2P
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. and plant growth regulator activity of)
IT 53792-68-0P 53792-69-1P 53792-70-4P 53792-71-5P 53792-72-6P
53792-73-7P 53792-74-8P 53792-75-9P 53792-76-0P
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. and plant-growth regulating activity of)
IT 53792-63-5P 53792-64-6P 53792-65-7P 53792-66-8P 53792-67-9P
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. and plant-growth regulator activity of)

L5 ANSWER 4 OF 4 REGISTRY COPYRIGHT 2003 ACS
RN 53792-79-3 REGISTRY
CN Glycine, N-(carboxymethyl)-N-(phosphonomethyl)-, N-oxide, disodium salt (9CI) (CA INDEX NAME)
OTHER NAMES:
CN **N-Phosphonomethyliminodiacetic acid N-oxide disodium salt**
MF C5 H10 N O8 P . 2 Na
LC STN Files: CA, CAPLUS, IFICDB, IFIPAT, IFIUDB, TOXCENTER, USPATFULL
CRN (53792-63-5)





4 REFERENCES IN FILE CA (1957 TO DATE)
4 REFERENCES IN FILE CAPLUS (1957 TO DATE)

REFERENCE 1

AN 100:187352 CA
TI N-Organophosphonomethylglycine N-oxides and their use to increase the sucrose content of sugarcane
IN Franz, John E.
PA Monsanto Co. , USA
SO U.S., 4 pp. Cont.-in-part of U.S. Ser. No. 6133,707, abandoned.
CODEN: USXXAM
DT Patent
LA English
IC A01N057-00
NCL 071086000

CC 5-3 (Agrochemical Bioregulators)
FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 4435204	A	19840306	US 1980-133379	19800324
	AT 792975	A	19780215	AT 1975-7929	19731210
	AT 345864	B	19780815		
	AT 343135	B	19780510	AT 1975-7931	19751017
	DK 7600538	A	19760210	DK 1976-538	19760210
	DK 142162	B	19800915		
	DK 142162	C	19810216		
	DK 7600537	A	19760210	DK 1976-537	19760210
	DK 141951	B	19800728		
	DK 141951	C	19801215		
PRAI	US 1972-313706	19721211			
	US 1975-613707	19750915			
	AT 1973-10302	19731210			
	DK 1973-6678	19731210			

AB Phosphonomethylglycine N-oxides, prepd. as described in US 4,062,669, increased sucrose [57-50-1] content of sugarcane when applied 2-10 wk prior to harvest, at .apprx.0.112-5.6 kg/ha. Examples are: N-phosphonomethyliminodiacetic acid N-oxide [53792-63-5], N-methyl-N-phosphonomethylglycine N-oxide [53792-84-0], and Et N,N-bis(phosphonomethyl)glycine N-oxide [69595-84-2]. These compds. increased juice purity percentage and sucrose content (Pol percent cane).

ST phosphonomethylglycine oxide sugarcane sucrose

IT Sugarcane
(sucrose of, organophosphonomethylglycine oxides increase of)

IT 57-50-1, biological studies
RL: BIOL (Biological study)
(of sugarcane, organophosphonomethylglycine oxides increase of)

IT 24569-83-3 53792-63-5 53792-64-6 53792-65-7 53792-66-8
53792-67-9 53792-68-0 53792-69-1 53792-70-4 53792-71-5
53792-73-7 53792-75-9 53792-76-0 53792-79-3 53792-80-6
53792-82-8 53792-84-0 53792-86-2 69595-83-1 69595-84-2
69595-86-4 69595-87-5 90041-38-6 90041-39-7 90041-40-0
90041-41-1
RL: BIOL (Biological study)
(sucrose content increase by, in sugarcane)

REFERENCE 2

AN 90:138024 CA

TI N-Organo-N-phosphonomethylglycine N-oxides and phytotoxicant compositions containing them

IN Franz, John E.
PA Monsanto Co., USA

SO U.S., 11 pp. Cont.-in-part of U.S. 4,062,669.
CODEN: USXXAM
DT Patent
LA English
IC A01N009-36
NCL 071086000

CC 29-7 (Organometallic and Organometalloidal Compounds)
Section cross-reference(s): 5

FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 4130412	A	19781219	US 1977-836187	19770926
	AT 792975	A	19780215	AT 1975-7929	19731210
	AT 345864	B	19780815		
	US 4062669	A	19771213	US 1975-613708	19750915

	AT 343135	B	19780510	AT 1975-7931	19751017
	DK 7600538	A	19760210	DK 1976-538	19760210
	DK 142162	B	19800915		
	DK 142162	C	19810216		
	DK 7600537	A	19760210	DK 1976-537	19760210
	DK 141951	B	19800728		
	DK 141951	C	19801215		

PRAI US 1972-313706 19721211
US 1975-613708 19750909
AT 1973-10302 19731210
DK 1973-6678 19731210

AB The title compds. RO2CCH2N(O)R3CH2P(O)(OR1)(OR2) [I, R1, R2 = H, metal cation, ammonium; R, R1 = alkyl; R3 = CnH2nCO2R, n = 1-10] were prepd. by oxidn. of RO2CCH2NR3CH2P(O)(OR1)(OR2) with per acids. Thus, 0.06 mol [HO2CCH2]2NCH2P(O)(OH)2, 100 mL. HOAc, and 0.6 g H2SO4 was treated with 0.21 mol H2O2 at 75-80.degree. to give 9.2 g [HO2CCH2]2N(O)CH2P(O)(OH)2 (II). At 4 lb/acre II gave 100% kill of Canada Thistle, Lambsquarters, Nutsedge, and Quackgrass.

ST herbicide phosphonomethylglycine oxide; phytotoxicant phosphonomethylglycine oxide; oxidn phosphonomethylglycine; glycine phosphonomethyl oxide

IT Herbicides
(phosphonomethylglycine oxides)

IT 53792-64-6 53792-66-8 53792-78-2 53792-79-3 53792-80-6
53792-81-7 53792-82-8 53792-83-9
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); BIOL (Biological study)
(herbicidal activity of)

IT 2439-99-8 5994-61-6 24569-83-3 53792-88-4 53792-89-5 69595-88-6
RL: RCT (Reactant); RACT (Reactant or reagent)
(oxidn. of)

IT 53792-63-5P 53792-67-9P 53792-68-0P 53792-69-1P 53792-70-4P
53792-71-5P 53792-72-6P 53792-74-8P 53792-75-9P 53792-76-0P
53792-84-0P 53792-86-2P 69595-82-0P 69595-83-1P 69595-84-2P
69595-85-3P 69595-86-4P 69595-87-5P
RL: AGR (Agricultural use); BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); SPN (Synthetic preparation); BIOL (Biological study); PREP (Preparation); USES (Uses)
(prepn. and herbicidal activity of)

IT 53792-65-7P 53792-73-7P
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. of)

REFERENCE 3

AN 90:138021 CA

TI N-Organo-N-phosphonomethylglycine-N-oxides and phytotoxicant compositions containing them

IN Franz, John E.
PA Monsanto Co., USA

SO U.S., 11 pp. Cont.-in-part of U.S. 4,062,669.
CODEN: USXXAM
DT Patent
LA English
IC A01N009-36
NCL 071086000
CC 29-7 (Organometallic and Organometalloidal Compounds)
Section cross-reference(s): 5

FAN.CNT 4

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 4131448	A	19781226	US 1977-836338	19770926

	AT 792975	A	19780215	AT 1975-7929	19731210
	AT 345864	B	19780815		
	US 4062669	A	19771213	US 1975-613708	19750915
	AT 343135	B	19780510	AT 1975-7931	19751017
	DK 7600538	A	19760210	DK 1976-538	19760210
	DK 142162	B	19800915		
	DK 142162	C	19810216		
	DK 7600537	A	19760210	DK 1976-537	19760210
	DK 141951	B	19800728		
	DK 141951	C	19801215		
PRAI	US 1972-313706	19721211			
	US 1975-613708	19750909			
	AT 1973-10302	19731210			
	DK 1973-6678	19731210			

AB The title compds., RO2CCH2N(O)R3CH2P(O)(OR1)(OR2) [I, R1, R2 = H, metal cation, ammonium; R = R1, lower alkyl; R3 = C1-12 alkyl, allyl, cyclohexyl, phenalkyl, phenoxyalkyl] were prepd. by oxidn. of RO2CCH2NR3CH2P(O)(OR1)(OR2) with a peroxide. Thus, 0.06 mol (HO2CCH2)2NCH2P(O)(OH)2, 100 mL HOAc, and 0.6 g H2SO4 was treated with 0.21 mol 30% H2O2 over 25 min to give 9.2 g (HO2CCH2)2N(O)CH2P(O)(OH)2 (II). At 4 lb/acre II killed Canada Thistle, Lambsquarters, Nutsedge, and Quackgrass.

ST herbicide phosphonomethylglycine oxide; phytotoxicant phosphonomethylglycine oxide; glycine oxide phosphonomethyl; oxidn phosphonomethylglycine

IT Herbicides
(phosphonomethylglycine oxides)

IT 53792-64-6 53792-66-8 53792-78-2 53792-79-3 53792-80-6
53792-81-7 53792-82-8 53792-83-9 53792-86-2
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); BIOL (Biological study)
(herbicidal activity of)

IT 2439-99-8 5994-61-6 24569-83-3 53792-88-4 53792-89-5 69595-88-6
RL: RCT (Reactant); RACT (Reactant or reagent)
(oxidn. of)

IT 53792-63-5P 53792-67-9P 53792-68-0P 53792-69-1P 53792-70-4P
53792-71-5P 53792-72-6P 53792-73-7P 53792-74-8P 53792-75-9P
53792-76-0P 53792-84-0P 53792-87-3P 69595-82-0P 69595-83-1P
69595-84-2P 69595-85-3P 69595-86-4P 69595-87-5P 69595-89-7P
69595-90-0P 69595-91-1P
RL: AGR (Agricultural use); BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); SPN (Synthetic preparation); BIOL (Biological study); PREP (Preparation); USES (Uses)
(prepn. and herbicidal activity of)

IT 53792-65-7P
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. of)

REFERENCE 4

AN 82:39571 CA

TI N-Organo-N-phosphonomethylglycine N-oxides and their use in plant growth regulating and phytotoxic preparations

IN Franz, John E.

PA Monsanto Co.

SO Ger. Offen., 68 pp.
CODEN: GWXXBX

DT Patent

LA German

IC C07F; A01N

CC 5-3 (Agrochemicals)
Section cross-reference(s): 29

FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 2361382	A1	19740612	DE 1973-2361382	19731210
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	DE 2361382	C3	19810212		
	BR 7309524	A0	19740829	BR 1973-9524	19731204
	RO 67869	P	19810622	RO 1973-76882	19731204
	NL 7316784	A	19740613	NL 1973-16784	19731207
	NL 173408	B	19830816		
	NL 173408	C	19840116		
	ES 421263	A1	19760616	ES 1973-421263	19731207
	BE 808448	A1	19740610	BE 1973-138707	19731210
	FR 2209770	A1	19740705	FR 1973-43994	19731210
	FR 2209770	B1	19781110		
	JP 49086549	A2	19740819	JP 1973-136936	19731210
	JP 52041336	B4	19771018		
	ZA 7309372	A	19741127	ZA 1973-9372	19731210
	DD 112598	C	19750420	DD 1973-20175229	19731210
	AU 7363435	A1	19750612	AU 1973-63435	19731210
	AT 7310302	A	19760415	AT 1973-10302	19731210
	AT 334129	B	19761227		
	CH 577784	A	19760730	CH 1973-17275	19731210
	GB 1449875	A	19760915	GB 1973-57150	19731210
	PL 91572	P	19770331	PL 1973-167194	19731210
	PL 94192	P	19770730	PL 1973-183652	19731210
	CS 179995	P	19771230	CS 1973-8527	19731210
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	AT 792975	A	19780215	AT 1975-7929	19731210
	AT 345864	B	19780815		
	CA 1032174	A1	19780530	CA 1973-187756	19731210
	SE 407804	B	19790423	SE 1973-16612	19731210
	SE 407804	C	19790802		
	HU 173367	P	19790428	HU 1973-MO890	19731210
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	AT 343135	B	19780510	AT 1975-7931	19751017
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	DK 142162	B	19800915		
	DK 142162	C	19810216		
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	DK 141951	B	19800728		
	DK 141951	C	19801215		
	ES 458382	A1	19781001	ES 1977-458382	19770502
	SE 7800073	A	19790704	SE 1978-73	19780103
	SE 436089	B	19841112		
	SE 436089	C	19850221		
PRAI	US 1972-313706	19721211			
	AT 1973-10302	19731210			
	DK 1973-6678	19731210			

AB R1O2CCH2N(O)RCH2P(O)(OR2)(OR3) [I,R = CH2CO2R1, CH2P(O)(OR2)(OR3), or C1-12 alkyl; R1 = H, lower alkyl, or metal; R2 and R3 = H, metal, NH4 or amine] are plant growth regulators and herbicides. Thus, N-phosphonomethyliminodiacetic acid N-oxide (R = ,CH2CO2H, R1 = R2 = R3 = H) [53792-63-5] at 4.5 kg/ha controlled nutsedge in greenhouse.

ST phosphonomethylglycine oxide herbicide; glycine oxide herbicide

IT Plant hormones and regulators
RL: BIOL (Biological study)
(phosphonomethylglycine oxide)

IT Herbicides

(phosphonomethylglycine oxides)
IT 2439-99-8 5994-61-6 24569-83-3 53792-88-4 53792-89-5
RL: RCT (Reactant); RACT (Reactant or reagent)
(oxidn. of)
IT 53792-77-1 53792-78-2 53792-79-3 53792-80-6 53792-81-7
53792-82-8 53792-83-9 53792-84-0 53792-85-1 53792-87-3
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); BIOL (Biological study)
(plant growth regulator activity of)
IT 53792-86-2P
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. and plant growth regulator activity of)
IT 53792-68-0P 53792-69-1P 53792-70-4P 53792-71-5P 53792-72-6P
53792-73-7P 53792-74-8P 53792-75-9P 53792-76-0P
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. and plant-growth regulating activity of)
IT 53792-63-5P 53792-64-6P 53792-65-7P 53792-66-8P 53792-67-9P
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. and plant-growth regulator activity of)

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E N-PHOSPHONOMETHYLIMINODIACETIC ACID/CN
E N-PHOSPHONOMETHYLIMINODIACETIC/CN
E PHOSPHONOMETHYLIMINODIACETIC/CN
L2 0 S E3
E N-PHOSPHONOMETHYLIMINODIACETIC ACID/CN
L3 0 S E3
E ACETODISPHONIC ACID/CN
E METHYLAMINO DIMETHYLENE PHOSPHONIC ACID/CN
L4 1 S PHOSPHONOMETHYLIMINOACETIC ACID/CN
E N-PHOSPHONOMETHYLIMINODIACETIC ACID/CN

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L5 4 S N-PHOSPHONOMETHYLIMINODIACETIC ACID

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L2              5 S L1

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L5              0 S L3 AND L4

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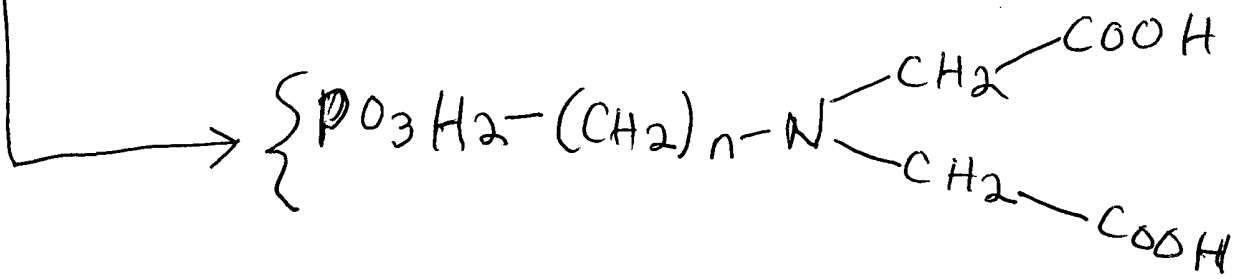

Structure in drawn
then search in Caplus

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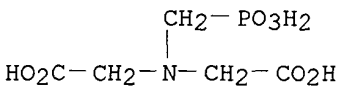
L3 ANSWER 1 OF 6 CAPLUS COPYRIGHT 2003 ACS
IT **475095-29-5**
RL: PRP (Properties)
(crystal structure of)
RN 475095-29-5 CAPLUS
CN Glycine, N-(carboxymethyl)-N-(phosphonomethyl)-, compd. with 1,4-diazabicyclo[2.2.2]octane, hydrate (2:2:3) (9CI) (CA INDEX NAME)

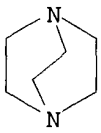
CM 1

CRN 5994-61-6
CMF C5 H10 N O7 P



CM 2

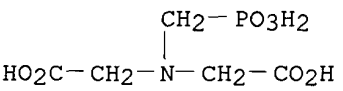
CRN 280-57-9
CMF C6 H12 N2



L3 ANSWER 2 OF 6 CAPLUS COPYRIGHT 2003 ACS
IT **87753-63-7**
RL: RCT (Reactant); RACT (Reactant or reagent)
(oxidn. of)
RN 87753-63-7 CAPLUS
CN Glycine, N-(carboxymethyl)-N-(phosphonomethyl)-, compd. with N,N'-diphenylguanidine (1:1) (9CI) (CA INDEX NAME)

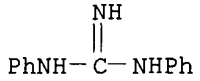
CM 1

CRN 5994-61-6
CMF C5 H10 N O7 P



CM 2

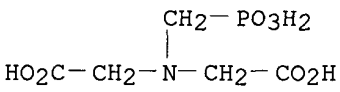
CRN 102-06-7
CMF C13 H13 N3



L3 ANSWER 3 OF 6 CAPLUS COPYRIGHT 2003 ACS
IT **87753-63-7**
RL: RCT (Reactant); RACT (Reactant or reagent)
(oxidn. of)
RN 87753-63-7 CAPLUS
CN Glycine, N-(carboxymethyl)-N-(phosphonomethyl)-, compd. with N,N'-diphenylguanidine (1:1) (9CI) (CA INDEX NAME)

CM 1

CRN 5994-61-6
CMF C5 H10 N O7 P



CM 2

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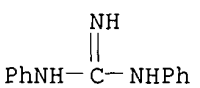
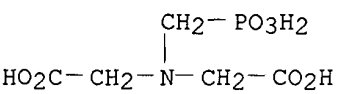
CMF C13 H13 N3

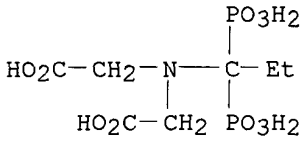


L3 ANSWER 4 OF 6 CAPLUS COPYRIGHT 2003 ACS
IT **81851-98-1**
RL: PRP (Properties)
(IR, NMR and photoelectron spectra of)
RN 81851-98-1 CAPLUS
CN Glycine, N-(carboxymethyl)-N-(phosphonomethyl)-, labeled with deuterium, tripotassium salt (9CI) (CA INDEX NAME)

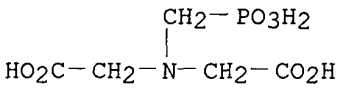


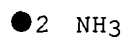
L3 ANSWER 5 OF 6 CAPLUS COPYRIGHT 2003 ACS
IT **70241-53-1DP**, zinc-potassium complex
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. of)
RN 70241-53-1 CAPLUS

CN Glycine, N-(carboxymethyl)-N-(1,1-diphosphonopropyl)- (9CI) (CA INDEX NAME)



L3 ANSWER 6 OF 6 CAPLUS COPYRIGHT 2003 ACS
IT **59726-67-9**
RL: BIOL (Biological study)
(Kentucky bluegrass turf growth suppression by)
RN 59726-67-9 CAPLUS
CN Glycine, N-(carboxymethyl)-N-(phosphonomethyl)-, diammonium salt (9CI) (CA INDEX NAME)





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L2              8 S L1

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L3             11 S L2
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L5              0 S L3 AND L4

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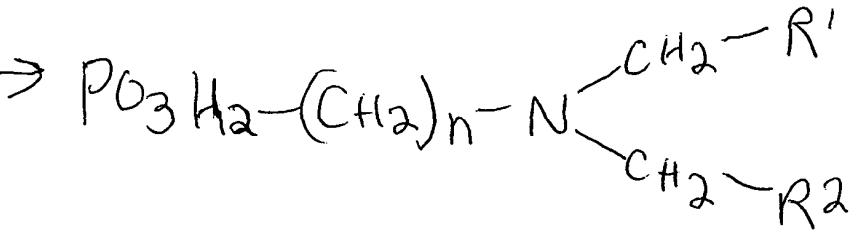

$R^1, R^2 \geq 1$ of $-PO_3H_2$

$-COOH$

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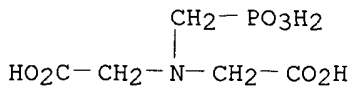
L3 ANSWER 1 OF 11 CAPLUS COPYRIGHT 2003 ACS
IT **475095-29-5**
RL: PRP (Properties)
(crystal structure of)
RN 475095-29-5 CAPLUS
CN Glycine, N-(carboxymethyl)-N-(phosphonomethyl)-, compd. with 1,4-diazabicyclo[2.2.2]octane, hydrate (2:2:3) (9CI) (CA INDEX NAME)

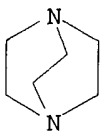
CM 1

CRN 5994-61-6
CMF C5 H10 N O7 P



CM 2

CRN 280-57-9
CMF C6 H12 N2



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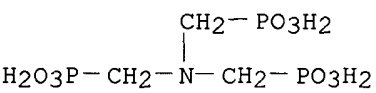
L3 ANSWER 2 OF 11 CAPLUS COPYRIGHT 2003 ACS
IT **334869-24-8**
RL: PRP (Properties)
(creation of polymer films with novel structures and properties by processing with inclusion compds.)
RN 334869-24-8 CAPLUS
CN .beta.-Cyclodextrin, compd. with hexaammonium [nitrilotris(methylene)]tris[phosphonate] (9CI) (CA INDEX NAME)

CM 1

CRN 94021-28-0
CMF C3 H12 N O9 P3 . 6 H3 N



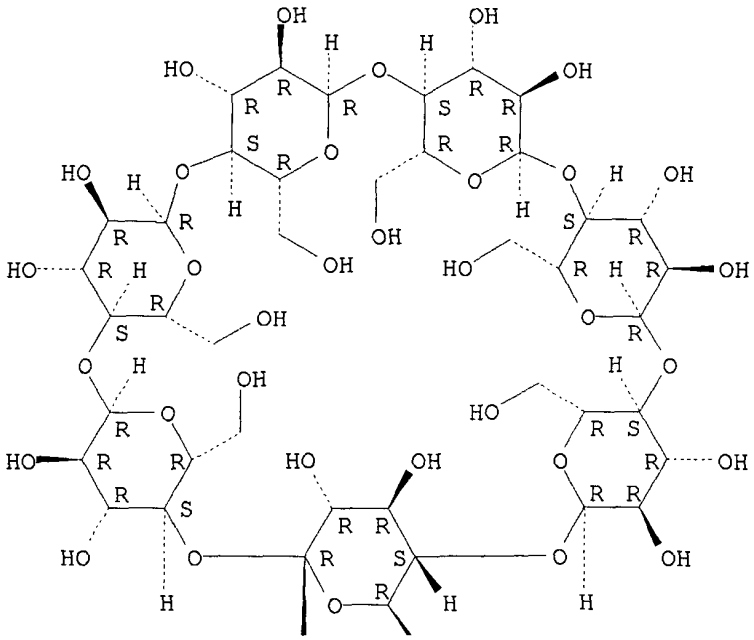
6 NH_3

CM 2

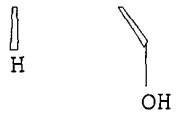
CRN 7585-39-9
CMF C42 H70 O35

Absolute stereochemistry.

PAGE 1-A



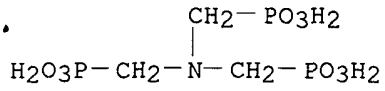
PAGE 2-A



L3 ANSWER 3 OF 11 CAPLUS COPYRIGHT 2003 ACS
IT **334869-24-8**
RL: MOA (Modifier or additive use); USES (Uses)
(flame retardant; creation of novel polymer materials by processing with inclusion compds.)
RN 334869-24-8 CAPLUS
CN .beta.-Cyclodextrin, compd. with hexaammonium [nitrilotris(methylene)]tris[phosphonate] (9CI) (CA INDEX NAME)

CM 1

CRN 94021-28-0
CMF C3 H12 N O9 P3 . 6 H3 N



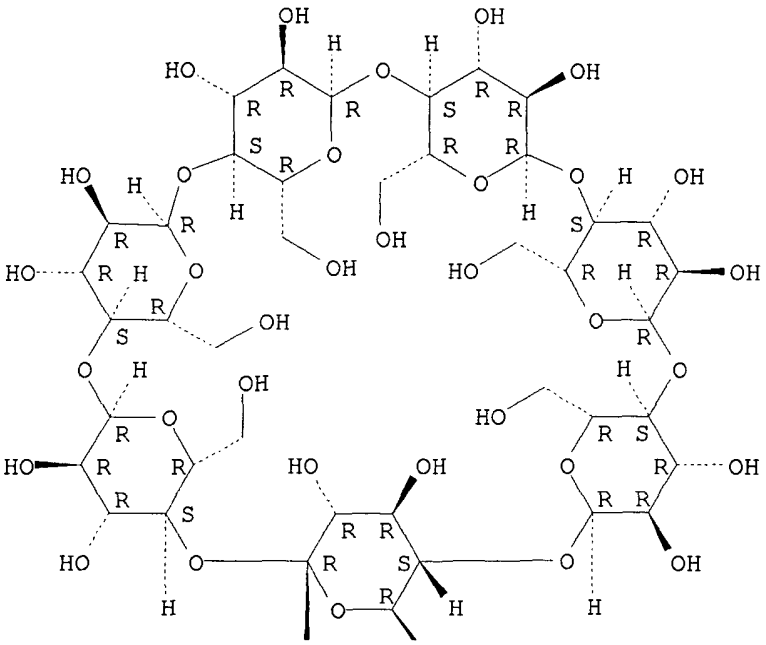
● 6 NH_3

CM 2

CRN 7585-39-9
CMF C42 H70 O35

Absolute stereochemistry.

PAGE 1-A



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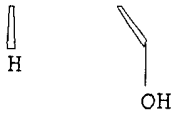
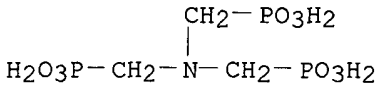


L3 ANSWER 4 OF 11 CAPLUS COPYRIGHT 2003 ACS
IT **334869-24-8**
RL: MOA (Modifier or additive use); PRP (Properties); USES (Uses)
(flame retardant; flame retardant-cyclodextrin inclusion compd. for poly(ethylene terephthalate))
RN 334869-24-8 CAPLUS
CN .beta.-Cyclodextrin, compd. with hexaammonium [nitrilotris(methylene)]tris[phosphonate] (9CI) (CA INDEX NAME)

CM 1

CRN 94021-28-0
CMF C3 H12 N O9 P3 . 6 H3 N



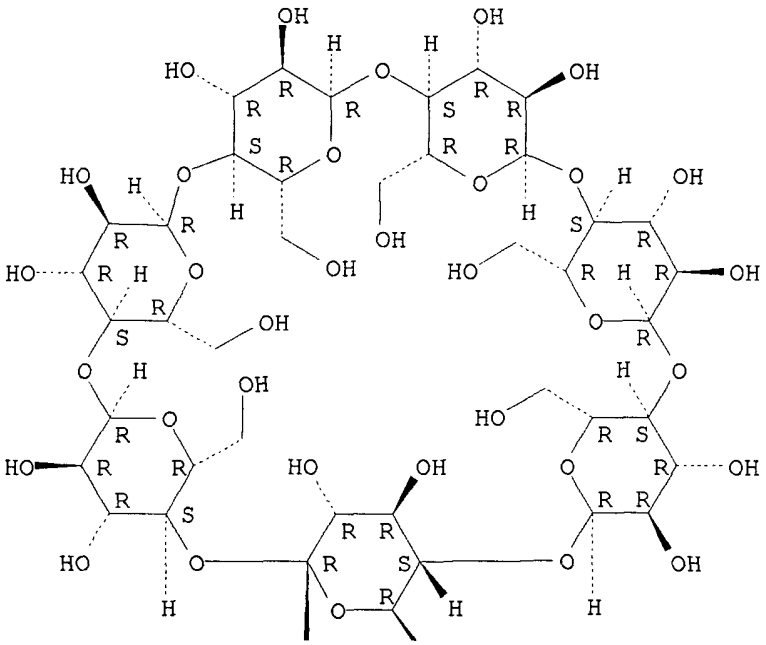
● 6 NH_3

CM 2

CRN 7585-39-9
CMF C42 H70 O35

Absolute stereochemistry.

PAGE 1-A



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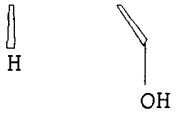
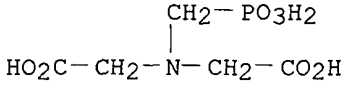


L3 ANSWER 5 OF 11 CAPLUS COPYRIGHT 2003 ACS

IT **87753-63-7**
RL: RCT (Reactant); RACT (Reactant or reagent)
(oxidn. of)
RN 87753-63-7 CAPLUS
CN Glycine, N-(carboxymethyl)-N-(phosphonomethyl)-, compd. with N,N'-diphenylguanidine (1:1) (9CI) (CA INDEX NAME)

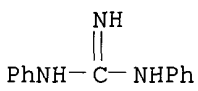
CM 1

CRN 5994-61-6
CMF C5 H10 N O7 P



CM 2

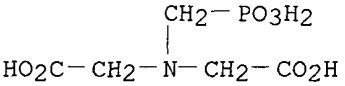
CRN 102-06-7
CMF C13 H13 N3



L3 ANSWER 6 OF 11 CAPLUS COPYRIGHT 2003 ACS
IT **87753-63-7**
RL: RCT (Reactant); RACT (Reactant or reagent)
(oxidn. of)
RN 87753-63-7 CAPLUS
CN Glycine, N-(carboxymethyl)-N-(phosphonomethyl)-, compd. with N,N'-diphenylguanidine (1:1) (9CI) (CA INDEX NAME)

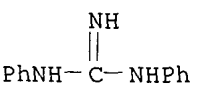
CM 1

CRN 5994-61-6
CMF C5 H10 N O7 P

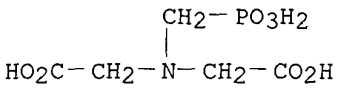


CM 2

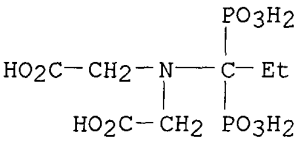
CRN 102-06-7
CMF C13 H13 N3



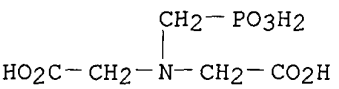
L3 ANSWER 7 OF 11 CAPLUS COPYRIGHT 2003 ACS
IT **81851-98-1**
RL: PRP (Properties)
(IR, NMR and photoelectron spectra of)
RN 81851-98-1 CAPLUS
CN Glycine, N-(carboxymethyl)-N-(phosphonomethyl)-, labeled with deuterium, tripotassium salt (9CI) (CA INDEX NAME)



L3 ANSWER 8 OF 11 CAPLUS COPYRIGHT 2003 ACS
IT **70241-53-1DP**, zinc-potassium complex
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. of)
RN 70241-53-1 CAPLUS
CN Glycine, N-(carboxymethyl)-N-(1,1-diphosphonopropyl)- (9CI) (CA INDEX NAME)

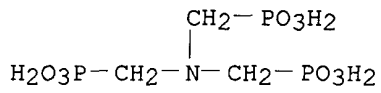


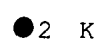
L3 ANSWER 9 OF 11 CAPLUS COPYRIGHT 2003 ACS
IT **59726-67-9**
RL: BIOL (Biological study)
(Kentucky bluegrass turf growth suppression by)
RN 59726-67-9 CAPLUS
CN Glycine, N-(carboxymethyl)-N-(phosphonomethyl)-, diammonium salt (9CI) (CA INDEX NAME)



L3 ANSWER 10 OF 11 CAPLUS COPYRIGHT 2003 ACS
IT **53584-55-7**
RL: PRP (Properties)
(ir spectrum of)
RN 53584-55-7 CAPLUS
CN Phosphonic acid, [nitrilotris(methylene)]tris-, labeled with deuterium,

dipotassium salt (9CI) (CA INDEX NAME)

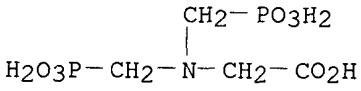


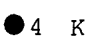


L3 ANSWER 11 OF 11 CAPLUS COPYRIGHT 2003 ACS
IT **17786-99-1**
RL: BIOL (Biological study)
(for hair bleaches, dyes and waving compns.)
RN 17786-99-1 CAPLUS
CN Glycine, N,N-bis(phosphonomethyl)-, tetrapotassium salt, compd. with hydrogen peroxide (2:5) (8CI) (CA INDEX NAME)

CM 1

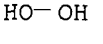
CRN 45162-17-2
CMF C4 H11 N O8 P2 . 4 K





CM 2

CRN 7722-84-1
CMF H2 O2



=> d his

(FILE 'HOME' ENTERED AT 14:00:37 ON 12 MAY 2003)

FILE 'REGISTRY' ENTERED AT 14:00:42 ON 12 MAY 2003
L1 STRUCTURE UPLOADED
L2 8 S L1

FILE 'CAPLUS' ENTERED AT 14:01:11 ON 12 MAY 2003
L3 11 S L2

=> s cmp or ?polish? or chemipolish? or chemimech? or planariz? or lap? or grind? or abrad?
7917 CMP